

# JOINT DOCTRINE FOR NONLETHAL WEAPONS

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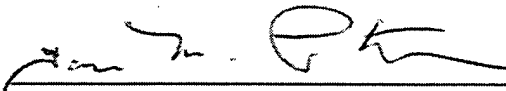
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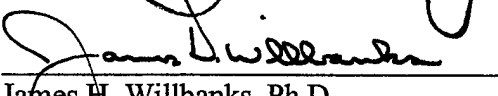
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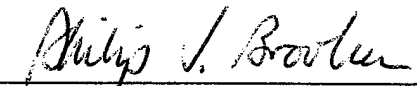
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## ABSTRACT

JOINT DOCTRINE FOR NONLETHAL WEAPONS, by Lieutenant Colonel Joseph M. Perry, USMC, 100 pages.

This study investigates whether the armed forces of the United States need joint doctrine for nonlethal weapons. The U.S. Department of Defense is gradually increasing its commitment of fiscal and manpower resources to the development of nonlethal technology; however, published information that provides guidance on how and under what conditions to employ the technology is scarce. In particular, joint doctrine for nonlethal weapons has not been developed.

Joint doctrine is only one of several methods that can be used to provide operational commanders with guidance on the employment of an emerging technology. This study, therefore, focuses on identifying the optimum method for enhancing the combat effectiveness of U.S. military forces. Using a descriptive and qualitative analysis approach, the study examines the purpose and functions of joint doctrine; the capabilities provided by nonlethal technology in support of national military objectives; and the current status of published information relating to the operational employment of nonlethal weapons.

The study concludes that joint doctrine for nonlethal weapons, by addressing a critical warfighting void, will improve the combat effectiveness of U.S. military forces. The study recommends that the Chairman of the Joint Chiefs of Staff publish this doctrine by 2003 and proposes specific topics to be included.

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## LIST OF ABBREVIATIONS

ACTD	Advanced Concept Technology Demonstration
AFRL	Air Force Research Laboratory
AFSFC	Air Force Security Forces Center
AFSOC	Air Force Special Operations Command
ALSA	Air Land Sea Application Center
ARL	Army Research Laboratory
ATL	Airborne Tactical Laser
BNLM	Bounding Nonlethal Munition
CA	Civil Affairs
CLADS	Canister-Launched Area Denial System
CALL	Center for Army Lessons Learned
CARL	Combined Arms Research Library
CINC	Commander in Chief
COTS	Commercial Off The Shelf
CTF	Combined Task Force
DARPA	Defense Advanced Research Projects Agency
DBBL	Dismounted Battlespace Battle Laboratory
DEW	Directed Energy Weapon
DOD	U.S. Department of Defense
DODD	Department of Defense Directive
DTIC	Defense Technical Information Center

EA	Executive Agent
EMD	Engineering and Manufacturing Development
EW	Electronic Warfare
FOC	Fully Operational Capability
FM	Field Manual
FY	Fiscal Year
GOTS	Government Off The Shelf
GVS	Ground Vehicle Stopper
HMMWV	High Mobility Multipurpose Wheeled Vehicle
IO	Information Operations
IOC	Initial Operational Capability
IPT	Integrated Product Team
JCATS	Joint Conflict and Tactical Simulation
JCIG	Joint Coordination and Integration Group
JCS	Joint Chiefs of Staff
JEL	Joint Electronic Library
JNLWD	Joint Non-Lethal Weapons Directorate
JNLWP	Joint Non-Lethal Weapons Program
Joint Pub	Joint Publication
JROC	Joint Requirements Oversight Council
JTF	Joint Task Force
JTTP	Joint Tactics, Techniques, and Procedures
JULLS	Joint Universal Lessons Learned System



JV	Joint Vision
JWC	Joint Warfighting Center
LASER	Light Amplification Stimulated by Excited Radiation
LVOSS	Light Vehicle Obscurant Smoke System
MAGTF	Marine Air-Ground Task Force
MCCM	Modular Crowd Control Munition
MCDP	Marine Corps Doctrinal Publication
MCLLS	Marine Corps Lessons Learned System
MCRP	Marine Corps Reference Publication
MCWL	Marine Corps Warfighting Laboratory
MEU (SOC)	Marine Expeditionary Unit (Special Operations Capable)
MISER	Minimum Signature Envelope Recoilless Gun
MOA	Memorandum of Agreement
MOOTW	Military Operations Other Than War
MOUT	Military Operations in Urban Terrain
MS	Milestone
MSCA	Military Support to Civil Authorities
MTW	Major Theater War
NCA	U.S. National Command Authorities
NEMP	Nonlethal Electromagnetic Pulse
NEO	Noncombatant Evacuation Operation
NLCDC	Nonlethal Crowd Dispersal Cartridge
NLW	Nonlethal Weapon

NLRF	Nonlethal Rigid Foam
NMS	National Military Strategy of the United States
NRL	Naval Research Laboratory
NSS	National Security Strategy of the United States
NSWC	Naval Surface Warfare Center
NTIS	National Technical Information Service
OC	Oleoresin Capsicum (Pepper Spray)
OCADS	Overhead Chemical Agent Dispersion System
ORD	Operational Requirements Document
OSD	Office of the Secretary of Defense
POM	Program Objective Memorandum
PSEAG	Physical Security Equipment Action Group
PSYOPS	Psychological Operations
PVIS	Portable Vehicle Immobilization System
RCA	Riot Control Agent
RDT&E	Research, Development, Testing and Evaluation
ROE	Rules of Engagement
SOF	Special Operations Forces
SROE	Standing Rules of Engagement
SSC	Smaller Scale Contingencies
TECOM	U.S. Army Test and Evaluation Command
TIP	Technology Investment Program
TRADOC	U.S. Army Training and Doctrine Command

UAV-NL	Unmanned Aerial Vehicle Nonlethal Payload/Delivery System
UAV	Unmanned Aerial Vehicle
UBTPS	Under Barrel Tactical Payload System
USA	United States Army
USACOM	United States Atlantic Command
USAF	United States Air Force
USD (A&T)	Under Secretary of Defense (Acquisition and Technology)
USMC	United States Marine Corps
USN	United States Navy
USSOCOM	United States Special Operations Command
VSS	Vessel Stopper System
VTOL	Vertical Take-Off and Landing
WMD	Weapons of Mass Destruction

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## CHAPTER 1

### INTRODUCTION

Kind-hearted people might of course think there was some ingenious way to disarm or defeat an enemy without too much bloodshed, and might imagine that this is the true goal of the art of war. Pleasant as it sounds, it is a fallacy that must be exposed: war is such a dangerous business that the mistakes which come from kindness are the very worst. The maximum use of force is in no way incompatible with the simultaneous use of the intellect. If one side uses force without compunction, undeterred by the bloodshed it involves, while the other side refrains, the first will gain the upper hand.<sup>1</sup>

Carl von Clausewitz, *On War*

#### Nature of the Problem

Since the end of the Cold War, nonlethal weapons (NLWs)--weapons "that are explicitly designed and primarily employed so as to incapacitate personnel or materiel while minimizing fatalities, permanent injury to personnel, and undesired damage to property and the environment"<sup>2</sup>--have been the subject of increasing interest in the international academic, political, and military communities. However, in spite of this interest, there is no clear consensus on the implications of employing these weapons. Some commentators have extolled the potential for the military application of nonlethal technology to be "as significant in magnitude as the emergence of gunpowder based

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<sup>1</sup>Carl von Clausewitz, *On War*, trans. and ed. Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1984), 75-76.

<sup>2</sup>Department of Defense, Department of Defense Directive 3000.3, *Policy for Non-Lethal Weapons* (Washington, DC: U.S. Government Printing Office, 9 July 1996), 1. This document is signed by Mr. John P. White, Deputy Secretary of Defense, but Mr. Charles F. Swett is credited with being the lead author in Douglas C. Lovelace Jr. and Steven Metz, *Nonlethality and American Land Power: Strategic Context and Operational Concepts* (Carlisle Barracks, PA: U.S. Army War College, Strategic Studies Institute, 15 June 1998), 3.

firearms during the European Renaissance”<sup>3</sup> and “a revolutionary form of military action.”<sup>4</sup> In contrast, the use of NLWs has also been compared to “bringing a club to a gun fight.”<sup>5</sup>

In the post-Cold War era, the U.S. Department of Defense (DOD) has responded to the new global strategic security environment by gradually increasing its commitment of fiscal and manpower resources to nonlethal technology. The fiscal year (FY) 1999 defense budget includes \$34.6 million for the Joint Non-Lethal Weapons Program (JNLWP).<sup>6</sup> A wide array of NLWs is currently being researched, developed, tested, and fielded for use by the armed forces of the U.S. The Army, Marine Corps, and Air Force are fielding generic NLWs capability sets for their operating forces. These capability sets are composed of commercial off-the-shelf (COTS) and government-off-the-shelf (GOTS) equipment and munitions and are intended to enhance force projection capabilities.<sup>7</sup> The U.S. *Defense Planning Guidance* for FY 2000-2005 states that “NLWs have proven useful across the range of operations, including both conventional combat operations and the many categories of military operations other than war. . . . Current efforts to study and understand the use of NLWs from the strategic to the tactical levels must be

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<sup>3</sup>Robert J. Bunker, ed., *Nonlethal Weapons: Terms and References*, INSS Occasional Paper 15 (Colorado Springs, CO: Institute for National Security Studies, U.S. Air Force Academy, July 1997), x.

<sup>4</sup>Alvin Toffler and Heidi Toffler, *War and Anti-War* (New York: Warner Books, Inc., 1993), 157-158.

<sup>5</sup>Lieutenant Colonel Martin N. Stanton, “What Price Sticky Foam?” *Parameters* 26, no. 3 (Autumn 1996): 68.

<sup>6</sup>Department of Defense, “Joint Non-Lethal Weapons Program Budget Increased,” *Joint Non-Lethal Weapons Directorate News* 2, no. 1 (November 1998): 1.

<sup>7</sup>Air Land Sea Application Center, *Multiservice Procedures for the Tactical Employment of Nonlethal Weapons* (Langley AFB, VA: ALSA, October 1998), II-1 – II-2.

integrated into all future military and interagency concepts and operations.<sup>8</sup> The 1997 *National Military Strategy of the United States* (NMS) notes that “the variety of challenges that we will face may also require less than lethal technology to meet demands at the lower end of the range of military operations.”<sup>9</sup>

Despite this apparent commitment by DOD to the military application of nonlethal technology, only a limited amount of published information is available on how and under what conditions to employ NLWs. Specifically, joint doctrine for NLWs does not exist. Before the U.S. commits additional resources to the development of nonlethal technology, a common operational framework for its employment must be developed. This study focuses on the issues involved in developing that framework.

### Significance of the Study

As will be seen from the literature review in chapter 2 and the bibliography, previous studies of nonlethal technologies can be grouped into two major categories. The first category is comprised of those studies that are primarily conceptual in nature. Included in this category are policies and regulations, and theoretical arguments for and against the integration of nonlethality into U.S. national security strategy (NSS) (for example, the notion that NLWs “demonstrate a high moral position, reverence for life, and commitment to containing violence at a minimum level”<sup>10</sup>). Studies in the second

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<sup>8</sup>Department of Defense Joint Non-Lethal Weapons Program, “A View to the Future” (brief presented at Quantico, VA, December 1998), Joint Non-Lethal Weapons Directorate, Quantico, VA.

<sup>9</sup>Chairman of the Joint Chiefs of Staff, *National Military Strategy of the United States of America* (Washington, DC: U.S. Government Printing Office, 1997), 26.

<sup>10</sup>Lieutenant Colonel Margaret-Anne Coppernoll, “The Nonlethal Weapons Debate,” *Naval War College Review* 52, no. 2 (Spring 1999): 113.

category focus on the technical aspects of nonlethal technology (for example, the physiological effects of a particular weapon system). Although these two categories contain a significant and growing amount of literature on the subject of nonlethal technology, very little research and analysis has been focused on the operational employment of this technology.

Several of the studies in the conceptual category have recommended the development of joint doctrine for NLWs in order to fill the void in published information on how and under what conditions to employ these weapons.<sup>11</sup> However, these recommendations have been made without fully examining whether or not joint doctrine is, in fact, the most effective solution for this problem. Joint doctrine is only one of several methods that can be used to address key warfighting voids. Other methods include joint tactics, techniques, and procedures (JTTP), as well as service and multiservice doctrine and TTP. This study will therefore attempt to determine the optimum medium for providing operational commanders with guidance on the employment of nonlethal technology. The fundamental question that this study will address is, Do the armed forces of the U.S. need joint doctrine for NLWs?

The intent of this thesis is to: (1) describe the purpose, functions, and responsibilities for development of joint doctrine; (2) examine the military capabilities needed to meet the NSS and NMS of the U.S.; (3) report the current state of nonlethal technology research, development, testing, and evaluation (RDT&E); (4) identify the current and potential operational capabilities provided by NLWs; (5) compare the

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<sup>11</sup>See Report of an Independent Task Force, *Non-Lethal Technologies: Military Options and Implications*, by Malcolm H. Wiener, chairman (New York: Council on Foreign Relations, 1995), 15-16; Lovelace and Metz, 34.



operational capabilities of NLWs with the military capabilities required by the NSS and NMS; (6) assess the available published doctrine relating to the joint employment of nonlethal technology; and (7) provide a conclusion as to whether joint doctrine for NLWs is necessary and, if joint doctrine is required, recommend an outline for that doctrine.

The remainder of this chapter will establish the necessary background information for a more thorough understanding of the nature of the problem the U.S. military faces in developing a common operational framework for the employment of nonlethal technology; identify assumptions, limitations, and delimitations of this study; and provide key definitions. Chapter 2 will provide information on the current status of professional literature in this field. Chapter 3 will explain in detail the methodology used in researching this problem, and Chapter 4 will describe the outcomes of that research. Chapter 5 will provide conclusions and some recommendations for further study.

### Background

The relatively short history of the NLW program in the U.S. can be traced to a 1991 decision by the Secretary of Defense to direct the formation of a DOD Nonlethal Strategy Group to assess alternative nonlethal defense strategies.<sup>12</sup> In 1996, the Office of the Secretary of Defense (OSD) published Department of Defense Directive (DODD) 3000.3, *Policy for Non-Lethal Weapons*. This document designated the Commandant of the U.S. Marine Corps (USMC) as the Executive Agent (EA) for the DOD Non-Lethal

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<sup>12</sup>Paul Wolfowitz, "Do We Need a Nonlethal Defense Initiative?" A Memorandum for the Secretary of Defense, March 1991, Department of Defense, Office of the Undersecretary of Defense (Policy), Washington, DC. A copy of this memorandum is contained in David A. Morehouse, "A New Strategic Era: A Case for Nonlethal Weapons," MMAS thesis (Fort Leavenworth, KS: U.S. Army Command and General Staff College, 1992), 238.

Weapons Program.<sup>13</sup> In January of the following year, the Joint Service Memorandum of Agreement (MOA) was signed. The objective of this MOA was "to develop and recommend, to the [Under Secretary of Defense (Acquisition and Technology)] USD (A&T), a fully integrated and coordinated NLW program, to include as appropriate classified NLW programs within the Department of Defense (DoD), that meet the intent of Congress and provide the best NLW technologies and equipment to support our operating forces."<sup>14</sup> This MOA also directed the EA to establish the Joint Non-Lethal Weapons Directorate (JNLWD). In January of 1998, the *Joint Concept for Non-Lethal Weapons* was published.

During Operation United Shield in September 1995, U.S. Marines, operating under a combined task force (CTF) led by Lieutenant General Anthony Zinni, USMC, obtained NLW systems to assist in protecting the withdrawal of UNOSOM II forces from Somalia. Other recent military operations in which NLWs have been employed include Operation Restore Democracy (USFORHAITI) in Haiti in November 1995 and October 1996; Operation Joint Endeavor and Operation Joint Guard in Bosnia in 1996 and 1997; and by U.S. Support Group Haiti in May 1997.<sup>15</sup>

Operational warfighting guidance is generally published either as doctrine or as TTP. The differences between doctrine and TTP, as well as the distinctions among joint,

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<sup>13</sup>Department of Defense, DODD 3000.3, *Policy for Non-Lethal Weapons*, 1.

<sup>14</sup> Department of Defense, "DoD Nonlethal Weapons (NLW) Program," *Memorandum of Agreement Among the Chief of Staff of the Army, Commandant of the Marine Corps, Chief of Naval Operations, Chief of Staff of the Air Force, and Commander in Chief, United States Special Operations Command* (Washington, DC, 21 January 1997), 1.

<sup>15</sup>Department of Defense Joint Non-Lethal Weapons Program, "A View to the Future."

service, and multiservice doctrine, may appear to be subtle, but they are critical to a thorough understanding of the results of this study. Because this study will attempt to determine the most effective medium for providing guidance on the operational employment of nonlethal technology, an understanding of basic terminology is necessary at this point. Unless otherwise noted, definitions used throughout this study will be from Joint Publication (Joint Pub) 1-02, *Department of Defense Dictionary of Military and Associated Terms*.

Joint Pub 1-02 defines doctrine as: "Fundamental principles by which the military forces or elements thereof guide their actions in support of national objectives. It is authoritative but requires judgment in application."<sup>16</sup> Joint doctrine is defined as "fundamental principles that guide the employment of two or more Services in coordinated action toward a common objective. It will be promulgated by the Chairman of the Joint Chiefs of Staff, in coordination with the combatant commands, Services, and Joint Staff."<sup>17</sup> Multiservice doctrine is defined as "fundamental principles that guide the employment of forces of two or more Services in coordinated action toward a common objective. It is ratified by two or more Services, and is promulgated in multi-Service publications that identify the participating Services."<sup>18</sup> Joint TTP are defined as "the actions and methods which implement joint doctrine and describe how forces will be employed in joint operations. They will be promulgated by the Chairman of the Joint

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<sup>16</sup>Chairman of the Joint Chiefs of Staff, Joint Pub 1-02, *Department of Defense Dictionary of Military and Associated Terms* (Washington, DC: U.S. Government Printing Office, 23 March 1994 As Amended Through 10 February 1999), 140.

<sup>17</sup>*Ibid.*, 236.

<sup>18</sup>*Ibid.*, 297.

Chiefs of Staff, in coordination with the combatant commands, Services, and Joint Staff."<sup>19</sup> As of 1 March 1999, the Joint Electronic Library (JEL) database lists 109 joint doctrine and TTP publications that either have been approved or are under development. The employment of NLWs is not among the subjects of these publications.<sup>20</sup> Is this a critical deficiency in U.S. warfighting capability?

The detailed methodology for determining whether the armed forces of the U.S. need joint doctrine for NLWs will be described in detail in chapter 3. However, in order to arrive at an answer to that fundamental question, this study addresses three secondary questions:

1. Does nonlethal technology provide a significantly new military operational capability to achieve U.S. strategic objectives?
2. Is there a critical void in extant joint, service and multiservice doctrine relating to the employment of nonlethal technology?
3. Will joint doctrine for NLWs enhance the combat effectiveness of U.S. forces?

### Assumptions

This study is based on three key assumptions. The first assumption is that the U.S. National Command Authorities (NCA) have already made the decision to develop and employ nonlethal technology. DODD 3000.3, which "establishes DOD policies and assigns responsibilities for the development and employment of NLWs," provides the

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<sup>19</sup>Ibid., 245.

<sup>20</sup>Chairman of the Joint Chiefs of Staff, *Joint Doctrine Hierarchy*, Joint Electronic Library [library on-line]; available from <http://www.dtic.mil/doctrine/index.html>; Internet; accessed 6 March 1999.

rationale for this assumption.<sup>21</sup> Therefore, the theoretical arguments for and against the integration of nonlethality into U.S. national security strategy will not be examined in this study. This study begins with the assumption that, as a matter of national policy, the U.S. is committed to the use of NLWs under certain conditions.

This study's second assumption is that nonlethal technology will only be employed in accordance with the laws of land warfare. Because nonlethal technology is still emerging, some of the related military operational law issues have not been fully addressed. Some of the weapons currently under development may eventually be rejected because they violate international agreements and laws on the use of biological and chemical weapons. Therefore, under DODD 3000.3, the Secretaries of the Military Departments and the Commander in Chief (CINC), U.S. Special Operations Command (USSOCOM) are directed to "ensure that a legal review of the acquisition of all nonlethal weapons is conducted. . . . [to] ensure consistency with the obligations assumed by the U.S. Government under all applicable treaties, with customary international law, and, in particular, the laws of war."<sup>22</sup>

The third assumption of this study is that certain nonlethal operational capabilities either are available now or will be available to the armed forces of the U.S. by the year 2010. This assumption is predicated on an analysis of the technical data that is available at this time, even if the particular weapon or system intended to provide that capability has not yet been fielded.

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<sup>21</sup>Department of Defense, DODD 3000.3, *Policy for Non-lethal Weapons*, 1.

<sup>22</sup>*Ibid.*, 3.

### Limitations

In conducting research for this study, three limitations were encountered. The most significant limitation was the lack of consensus on basic terminology and definitions among the scientific, academic, and military communities. In addition to the term "nonlethal" which is used in this study, the terms "less-lethal," "less-than-lethal," "soft kill," "disabling technologies" and "mission kill," are found in the literature to describe essentially the same capability. At least one author makes the distinction between lethal and nonlethal as the difference between antipersonnel and antimateriel.<sup>23</sup> Unless otherwise indicated, the terminology and definitions that will be used throughout this study are those given in this chapter and in the glossary.

Another limitation of this study is the fact that many NLWs are still in the conceptual stage of development. As stated earlier, one of the basic assumptions of this study is that, based on the scientific data that is available at this time, a particular nonlethal weapon or system will be able to provide a certain operational capability, even if the weapon or system has not yet been fielded.

A third limitation on this study is the fact that the technical data on some nonlethal technology is classified. In order to make the results of this study accessible to all levels of the military and civilian communities, only unclassified information is included in this thesis. This is not a significant limitation because this study is focused primarily on how the U.S. military can employ the operational capabilities of nonlethal

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<sup>23</sup>David A. Morehouse, *Nonlethal Weapons: War Without Death* (Westport, CT: Praeger Publishers, 1996), 16.

technology rather than on the technical (and often classified) characteristics of a specific weapon or system.

### Delimitations

Because the operational employment of nonlethal technology is a broad subject, the scope of this study was narrowed and focused in three ways. First, research was restricted to certain specific classes of nonlethal technology. The range of nonlethal technology extends from the subatomic level to cyberspace, but this study only examines the specific categories of acoustics, antitraction substances, caltrops, combustion modifiers, directed energy weapons (DEW), electromagnetics, entanglers, nonlethal ballistic projectiles, opticals, riot control agents (oleoresin capsicum)(RCA (OC)), and superpolymers. These particular categories of NLWs were chosen because they are programs that the JNLWP is either currently funding or has identified as a concept that merits further exploration between now and the year 2010.

This study does not examine the use of computer viruses even though their effects may be nonlethal. Their use can be considered to fall under the category of information operations, which is specifically excluded from the DOD definition of NLWs that has been chosen for this study. Although certain directed energy weapons (DEW) are considered nonlethal under DODD 3000.3, blinding lasers, because their effect is irreversible, are not considered to be NLWs and are therefore not included in this study.<sup>24</sup>

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<sup>24</sup>William J. Perry, "DOD Announces Policy on Blinding Lasers," news release No. 482-95, Office of the Assistant Secretary of Defense (Public Affairs), 1 September 1995, reported in Lovelace and Metz, 42.

The second delimitation is to restrict this study to an examination of the employment of nonlethal technology in U.S. military operations outside of the U.S. An examination of civilian (for example, law enforcement) applications of nonlethal technology, multinational operations involving the use of nonlethal technology, and the use of nonlethal technology in military support to U. S. civil authorities (MSCA), is beyond the scope of this study.

The third restriction imposed on this study is the time period covered. Although certain forms of nonlethal warfare have been conducted throughout recorded history, this form of warfare has taken on added importance to the U.S. since the end of the Cold War. This study therefore only examines the period from 1989 until 2010. The year 2010 was chosen so that the capabilities of nonlethal technology could be evaluated against the concepts and requirements outlined in *Joint Vision (JV) 2010*.

### Definitions

As previously noted, one of the challenges associated with investigating the military application of nonlethal technology is the lack of consensus on basic terminology and definitions. For the purposes of this study, the following definitions will be used:

Acoustics. A class of weapons that emit a high power, very low-frequency (infrasound) or very high-frequency (ultrasound) sound.<sup>25</sup> These weapons "employ sound waves in a concentrated form against various targets. The effect is the shattering of metal or composite materials on machines or building materials."<sup>26</sup>

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<sup>25</sup>Bunker, 2-3.

<sup>26</sup>Morehouse, *Nonlethal Weapons*, 20.



Antitraction substances. Substances that "can be aerosol applied, poured, or painted on any surface, rendering it slippery or boggy. Some of these substances will lubricate the surface, preventing traction of people and machines; others will soak into the surface on which they are applied, making a chemical mud that prevents movement of personnel or equipment."<sup>27</sup>

Caltrops. "A personnel and vehicular barrier device with four projecting spikes so arranged that when three of the spikes are on the ground, the fourth points upward."

Combustion Modifiers. "Various gases, foams, or liquids that are designed to choke internal combustion engines. . . . There are also additives that will corrode the internal components of any engine that aspirates the substance."<sup>28</sup>

Directed energy weapons (DEW). "Any coherent or concentrated energy source (e.g., lasers). The effect is the burning, cracking, distortion, or impairment of conventional or unconventional machines. In people, these technologies can be preset to invoke stammer, confusion, or coma."<sup>29</sup>

Electromagnetic weapons. Weapons that use high-powered microwaves to "disrupt brainwaves, communications, or any electronic component of a machine. The effect is confusion, stupor, or coma in people or animals and the disruption, scrambling, or jamming of electronics."<sup>30</sup>

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<sup>27</sup>Ibid., 19.

<sup>28</sup>Ibid.

<sup>29</sup>Ibid., 20.

<sup>30</sup>Morehouse, *Nonlethal Weapons*, 20.

Entanglers. NLWs that use polymers, fibers, or wire to entrap personnel or vehicles in a net, foul propellers, and/or stop fan blades.<sup>31</sup>

Nonlethal ballistics. A class of NLWs which deliver a blunt impact (non-penetrating) projectile (for example, rubber bullets).<sup>32</sup>

Nonlethal weapons. Weapons

that are explicitly designed and primarily employed so as to incapacitate personnel or materiel, while minimizing fatalities, permanent injury to personnel, and undesired damage to property and the environment. Unlike conventional lethal weapons that destroy their targets principally through blast, penetration, and fragmentation, non-lethal weapons employ means other than gross physical destruction to prevent the target from functioning. Non-lethal weapons are intended to have one, or both, of the following characteristics: (a) they have relatively reversible effects on personnel or materiel, and (b) they affect objects differently within their area of influence.<sup>33</sup>

This definition does not include information warfare, electronic warfare, or any other military capability not designed specifically for the purpose of minimizing fatalities, permanent injury to personnel, and undesired damage to property and the environment, even though these capabilities may have nonlethal effects. This definition does not require or expect NLWs to have zero probability of producing fatalities or permanent injuries. Nonlethal weapons are intended to significantly reduce the probability of such fatalities or injuries as compared with traditional military weapons, which achieve their effects through the physical destruction of targets.<sup>34</sup>

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<sup>31</sup>Bunker, 13-14.

<sup>32</sup>Morehouse, *Nonlethal Weapons*, 20.

<sup>33</sup>Department of Defense, DODD 3000.3, *Policy for Non-lethal Weapons*, 1.

<sup>34</sup>Department of Defense, *A Joint Concept for Non-Lethal Weapons* (Quantico, VA: Joint Non-Lethal Weapons Directorate, 1998), 1.

Optical munitions. "A class of non-lethal weapons that rely upon either a multi-directional or uni-directional intense burst of light (laser) generated by the high-explosive shock heating of an inert gas."<sup>35</sup> Also used to refer to a class of NLWs that "emit extremely bright light causing temporary blindness."<sup>36</sup>

Riot Control Agents (Oleoresin Capsicum) (RCA (OC)). "A food product obtained from chili peppers which are dried and ground into a fine powder. When mixed with an emulsifier such as mineral, vegetable, soy oil, or water, it may be sprayed from a variety of dispensers and used as an irritant for safely controlling violent persons or vicious animals and/or restoration and maintenance of order."<sup>37</sup>

Superpolymers. "Various substances applied by aerosol, liquid, or powder form that will (when conditions dictate) form an impenetrable surface over the target. The effect is similar to applying a permanent, quick-drying glue over an entire target, rendering all its moving components ineffective."<sup>38</sup>

This chapter outlined the nature and significance of the problem the U.S. military faces in developing a common operational framework for the employment of nonlethal technology, identified assumptions, limitations and delimitations of the study, and defined key terms. Chapter 2 will provide an overview of the current status of professional literature in the field of nonlethal technology.

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<sup>35</sup>Bunker, 19.

<sup>36</sup>Ibid., 17.

<sup>37</sup>Ibid., 26.

<sup>38</sup>Morehouse, *Nonlethal Weapons*, 19.

## CHAPTER 2

### REVIEW OF LITERATURE

This chapter provides an overview of the professional literature in the field of nonlethal technology. The key works in the field, patterns or trends of prior research, and gaps in previous research will be identified. In keeping with the delimitations outlined in chapter 1, this study only examined material written between January 1989 and March 1999.

Since 1989, over four hundred books, articles, documents, and unpublished materials relating to nonlethal technology have been written.<sup>1</sup> As noted in chapter 1, previous studies of nonlethal technologies can be grouped into two major categories: conceptual and technical. In addition to these two descriptive categories (that is, studies that provide the results of research and analysis), an examination of a third category of prescriptive material was necessary to meet the goals of this study. This category can be labeled "operational" publications and includes joint, service, and multiservice doctrine and TTP.

#### Sources of Research Material

The electronic resources of the Combined Arms Research Library (CARL) at Fort Leavenworth, Kansas, provided access to the majority of reference material used in this study. Conceptual reference material was provided by the ProQuest Direct and

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<sup>1</sup>Extrapolated from Bunker, 34-79, and multiple electronic bibliographical searches conducted for this study.

FirstSearch databases for newly published nontechnical periodicals and books, while the *Reader's Guide to Periodical Literature* and the *Air University Index to Military Periodicals* provided information on less current books and periodicals. The Military Educational Research Library (MERLN) facilitated a search of other Army libraries. Internet search engines provided numerous sites for information on nonlethal technology, technical and nontechnical. The homepages for DOD and for each of the military services contained links to service school libraries and doctrine centers. The Center for Army Lessons Learned (CALL), the Marine Corps Lessons Learned System (MCLLS), the United States Naval Institute (USNI) database, and the Joint Universal Lessons Learned System (JULLS) provided information on joint and service tactics, techniques, and procedures. The on-line and CD-ROM versions of the Joint Electronic Library (JEL) were the primary sources used for information on joint doctrine.

In the area of technical data, the Defense Technical Information Center (DTIC) and the National Technical Information Service (NTIS) databases for scientific and technical reports were particularly useful. From these databases, reports from the Defense Advanced Research Projects Agency (DARPA), the U.S. Army Test and Evaluation Command (TECOM), the Army Research Laboratory (ARL), the Marine Corps Warfighting Laboratory (MCWL), the Air Force Research Laboratory (AFRL), the Dismounted Battlespace Battle Laboratory (DBBL), and the Naval Research Laboratory (NRL) were accessed. Transcripts of presentations given at the Non-Lethal Defense Conference II in March 1996 and the Non-Lethal Defense Conference III in February 1998 provided a significant amount of background information on nonlethal policy, tactics, and training, as well as technical information.

Personal interviews and correspondence also provided a significant amount of material for this study. From the Joint Non-Lethal Weapons Directorate, Colonel Andrew F. Mazzara, U.S. Marine Corps, Director; Captain Steve Simpson, U.S. Marine Corps, Deputy Director for Operations; Mr. John Busic, Project Engineer; and Mr. Don Anderson, Support Engineer, provided background material on the program as well as unclassified information on current nonlethal acquisition, research, and development programs. Captain Robert Murphy, U.S. Army (USA), CALL, Fort Leavenworth, Kansas, provided information on U.S. Army lessons learned with respect to nonlethal munitions, training, and equipment, particularly during Operation Joint Endeavor and Operation Joint Guard. Lieutenant Colonel Peter Vercruysse, USMC, from the U.S. Atlantic Command (USACOM) Joint Warfighting Center (JWC) Doctrine Division, and Lieutenant Colonel W. David. Zoellers, USA, from the Air Land Sea Application Center (ALSA), provided indispensable information on the joint doctrine development process.

### Conceptual

This category is important to this study for two reasons. First, it establishes a sound foundation for understanding the variety of arguments for and against the integration of nonlethality into U.S. NSS. Second, several previous studies in this category recommended the development of joint doctrine for NLWs in order to fill the void in published information on how and under what conditions to employ these weapons. The current study will examine the validity of that proposed solution.

The research material in this category can be further divided into three subcategories: academic, national policy, and mass media. Of the many published

academic studies, several key works emerge. In *Nonlethality and American Land Power: Strategic Context and Operational Concepts*, Douglas C. Lovelace Jr. and Dr. Steven Metz, professors at the U.S. Army War College, explain the growing interest in nonlethality in terms of strategic context, provide arguments for and against the use of nonlethal technology, and finally, propose several operational concepts for the employment of nonlethal technology. One of their closing recommendations is that "joint doctrine setting forth the operational concepts for the use of nonlethality in design of operations should be developed and promulgated."<sup>2</sup> Professors Lovelace and Metz make a strong case for the use of NLWs and provide operational concepts that are useful in understanding the capabilities that NLWs provide to the armed forces of the U.S. The authors' assertion that joint doctrine for the employment of nonlethal technology is necessary will be examined as the subject of this study.

Dr. Robert J. Bunker has made a significant contribution to the study of nonlethal technology. In two of his studies, *Nonlethal Technology and Fourth Epoch War: A New Paradigm of Politico-Military Force* and *Five Dimensional (Cyber) Warfighting: Can the Army After Next be Defeated Through Complex Concepts and Technologies?* Dr. Bunker makes a persuasive argument that nonlethal technology will revolutionize the conduct of future warfare. *Nonlethal Weapons: Terms and References*, for which Dr. Bunker is the editor, is the best single reference on terms and descriptions relating to nonlethal technology and provides the most comprehensive list of references available.<sup>3</sup>

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<sup>2</sup>Lovelace and Metz, 34.

<sup>3</sup>Bunker, 34-79.

In his book, *Combat in Hell: A Consideration of Constrained Urban Warfare*, Dr. Russell W. Glenn examines the challenges associated with the use of force in military operations on urban terrain (MOUT). He specifically analyzes “constrained” urban warfare; that is, warfare conducted with the requirement to minimize collateral damage and both friendly and noncombatant casualties. In *Combat in Hell*, he devotes a short section to the use of NLWs in this environment.<sup>4</sup> Dr. Glenn’s work is important to the current study because, taking into account changing world demographics, it is almost inevitable that future conflict will occur in and around urban centers. If joint doctrine for NLWs is required, it must address the unique conditions that the urban environment imposes on operational employment of such weapons. Also, as Dr. Glenn notes, his analysis of the requirements for conducting constrained urban warfare has applications in other environments in which U.S. military forces may find themselves.<sup>5</sup>

Alvin and Heidi Tofflers’ *War and Anti-War* was the genesis for this study. The book examines warfare within the context of what the authors see as a fundamental change that is taking place in civilization. The Tofflers’ theory that the world is transitioning from an industrial-based society to a knowledge-based society requires a new way of thinking about war. Nonlethal technology is an important component of their conceptual framework because they view nonlethality “not as a simple replacement for war, or an extension of peace but as something different--something radically new in global affairs: an intermediate phenomenon, a pausing place, an arena for contest in

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<sup>4</sup>Russell W. Glenn, *Combat in Hell: A Consideration of Constrained Urban Warfare* (Santa Monica, CA: RAND, 1996), 36.

<sup>5</sup> *Ibid.*, 43.



which more outcomes could be decided bloodlessly.”<sup>6</sup> The authors recognize that doctrine must support any changes in military technology, but offer little in the way of specific recommendations. In this study, the Tofflers’ general concepts will be examined to determine if and how they can be used to develop a common framework for U.S. military employment of nonlethal technology.

Major David A. Morehouse’s *Nonlethal Weapons: War Without Death* examines the “theory that there is a linkage among the strategic setting, the national security strategy, the national military strategy, and the kinds of weapons and forces that a nation develops to support power projection and achieve those strategic objectives.”<sup>7</sup> Major Morehouse, a 1992 graduate of the U.S. Army Command and General Staff College, is a strong advocate for the use of NLWs. In his book, he explains, “why, in a new strategic era, alternative weapons and technologies of a nonlethal class might better serve our national interests.”<sup>8</sup> *War Without Death* is useful in establishing a strategic background for an analysis of the operational employment of NLWs. Major Morehouse attempts to answer the question, Why use NLWs? The current study examines how to use them.

In addition to published material in this category, two unpublished Command and General Staff College Master of Military Art and Science theses focused on NLWs. Major David A. Morehouse’s 1992 thesis, “A New Strategic Era: A Case for Nonlethal Weapons,” formed the basis for his 1996 book, *War Without Death*. Major Stephen R. Pope, Canadian Forces, in his 1995 thesis, “Nonlethality and Peace Operations,”

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<sup>6</sup>Toffler and Toffler, 157.

<sup>7</sup>Morehouse, 9.

<sup>8</sup>Ibid.

concluded that "nonlethality can provide some significant benefits for peace operations, especially for peacekeeping missions that approach peace-enforcement."<sup>9</sup> In their conclusions and recommendations, both authors raise important issues relating to the development of doctrine for nonlethal technology. The current study will address those issues in detail.

Under the subcategory of national policy are included publications such as the *National Security Strategy of the United States* and the *National Military Strategy of the United States*. An important policy-related work is the 1995 report of an independent task force sponsored by the Council on Foreign Relations entitled *Non-Lethal Technologies: Military Options and Implications*. The conclusions of the task force were that "vigorous exploration of nonlethal technologies is politically, militarily, and morally appropriate, and affordable as well," and that it is "essential that the Department of Defense establish policy, doctrine and structure covering all aspects of nonlethal conflict."<sup>10</sup> The current study examines the requirements for doctrine recommended by this task force.

Based upon the increase in mass media coverage over the past five years, there appears to be greater public awareness of nonlethal technologies. General interest magazines such as *The Economist*, *Foreign Affairs*, and *U.S. News and World Report*, periodically contain stories relating to NLWs.<sup>11</sup> Readers of military service journals,

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<sup>9</sup>Stephen R. Pope, "Nonlethality and Peace Operations," MMAS thesis (Fort Leavenworth, KS: U.S. Army Command and General Staff College, 1995), iii.

<sup>10</sup>Report of an Independent Task Force, 15-16.

<sup>11</sup>See *The Economist*, "The 21st century army: A new but risky sort of war," 2 January 1999, 28; Michael O' Hanlon, "Can High Technology Bring U.S. Troops Home?" *Foreign Policy*, no. 113 (Winter 1998-99): 72-86; and Douglas Pasternak, "Wonder Weapons," *U.S. News and World Report*, 7 July 1997, 38-46.

magazines, and newspapers such as *Armed Forces Journal International*, *Marine Corps Gazette*, *Airpower Journal*, *Parameters*, *Naval War College Review*, *U.S. Naval Institute Proceedings*, and *Navy Times* have also seen an increase in the number and frequency of articles on nonlethal technology.<sup>12</sup> In addition to information contained in the print media, a British-produced documentary on NLWs is occasionally broadcast in the U.S. over the cable Discovery Channel. The material in this category is an excellent source of current, unclassified, background information on nonlethal technology.

#### Technical

The JNLWD provided the majority of the unclassified, technical data used in this study. An invaluable resource was the JNLWP Internet web site (<http://www.usmc.mil/nlw>). Available from this site are several publications related to the JNLWP, program background information and current news, and links to other NLW-related sites such as DTIC, ARL, MCWL, AFRL, and NRL.

#### Operational

Publications in this category provide operationally oriented, prescriptive information that either directly references the employment of nonlethal technology or could potentially impact on the development of joint doctrine for NLWs. Searches of the

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<sup>12</sup>See Senator Bob Smith, "Appropriate Response: Nontraditional Missions Demand Less-Than-Lethal Weapons," *Armed Forces Journal International* 133, no. 11 (June 1996): 55; Colonel Frederick M. Lorenz, "'Less-Lethal' Force in Operation UNITED SHIELD," *Marine Corps Gazette* 79, no. 9 (September 1995): 68-76; Chris Morris, Janet Morris, and Thomas Baines, "Weapons of Mass Protection: Nonlethality, Information Warfare, and Airpower in the Age of Chaos," *Airpower Journal* 9, no. 1 (Spring 1995): 15-29; Stanton, 63-68; Coppemoll, 112-131; Captain Stephen A. Simpson and Gunnery Sergeant Stéven G. Carlson, "Training for Measured Response," *U.S. Naval Institute Proceedings* 124, no. 9 (September 1998): 59; and Gidget Fuentes, "Corps Directs Energy Into 'Exotic' Non-lethals," *Navy Times*, 7 September 1998, 16.

on-line and CD-ROM versions of the JEL provided the majority of information on joint, service and multiservice publications, CJCS directives, joint and service vision documents such as *JV 2010*, the *Joint Doctrine Encyclopedia*, and training and research papers. The appendix to this study, "Potential Sources of Joint Doctrine for Nonlethal Weapons," provides a list of those publications that will have some bearing on the operational employment of nonlethal technology. Joint and service-specific lessons learned were important sources from which to derive the operational capabilities of NLWs described in chapter 4.

This chapter has provided an overview of the professional literature in the field of nonlethal technology, including sources of research material, the key works in the field, patterns or trends of prior research, and gaps in previous research that this study intends to fill. The next chapter will explain in detail the methodology used in researching the requirement for joint doctrine for NLWs.

## CHAPTER 3

### RESEARCH METHODOLOGY

This chapter will describe the descriptive and qualitative analysis methodology that was used in this study. Based on the primary research question, the approach that was taken included identifying the secondary research questions to be answered, the data required to answer the questions, the sources of that data, the criteria used to evaluate the data, and the methods by which the data is analyzed in terms of causes, consequences, and relationships.

In order to answer the primary research question, Do the armed forces of the U.S. need joint doctrine for NLWs? an eight step process was used:

1. Describe the purpose, functions, and responsibilities for development of joint doctrine.
2. Define the evaluation criteria for the development of joint doctrine for NLWs.
3. Determine U.S. armed forces capability requirements.
4. Examine current NLW RDT&E.
5. Analyze the current and potential operational capabilities of NLWs.
6. Compare the operational capabilities of NLWs with armed forces capability requirements.
7. Examine the published joint, service, and multiservice doctrine and TTPs relating to the operational employment of nonlethal technology.
8. Evaluate the data collected against the criteria for joint doctrine.

The remainder of this chapter will provide detailed information on each of these eight steps.

### Purpose, Functions, and Responsibilities for Development of Joint Doctrine

In order to determine if joint doctrine for NLWs is required, it is first necessary to understand the purpose and functions of joint doctrine in general. As noted in chapter 1, joint doctrine is defined in Joint Pub 1-02, *Department of Defense Dictionary of Military and Associated Terms*, as the "fundamental principles that guide the employment of forces of two or more Services in coordinated action toward a common objective."<sup>1</sup> Joint Pub 1, *Joint Warfare of the Armed Forces of the United States*, states that, "Though neither policy nor strategy, joint doctrine deals with the fundamental issue of how best to **employ the national military power to achieve strategic ends** [emphasis added]. As such, it represents authoritative guidance for the joint employment of the Armed Forces. . . . Joint doctrine offers a common perspective from which to plan and operate, and fundamentally shapes the way we think about and train for war."<sup>2</sup> More succinctly, Joint Pub 1-01, *Joint Publication System: Joint Doctrine and Joint Tactics, Techniques, and Procedures Development Program*, states that the "purpose of joint doctrine and JTTP is to **enhance the combat effectiveness of US forces**" [emphasis added].<sup>3</sup>

The functions of joint doctrine are to:

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<sup>1</sup>Joint Pub 1-02, 140.

<sup>2</sup>Chairman of the Joint Chiefs of Staff, Joint Pub 1, *Joint Warfare of the Armed Forces of the United States* (Washington, DC: U. S. Government Printing Office, 10 January 1995), I-3-4.

<sup>3</sup>Chairman of the Joint Chiefs of Staff, Joint Pub 1-01, *Joint Publication System: Joint Doctrine and Joint Tactics, Techniques, and Procedures Development Program* (Washington, DC: U. S. Government Printing Office, 30 July 1992), I-1.

1. Guide the joint employment of joint forces
2. Provide the national position for multinational doctrine consistent with existing security procedures
3. Provide a basis for joint training
4. Provide instructional material for the military education system
5. Inform U.S. Government agencies concerning the employment of U.S. joint forces<sup>4</sup>

Joint doctrine is written for those who:

1. Provide strategic direction to joint forces (Chairman of the Joint Chiefs of Staff, commanders of combatant commands).
2. Employ joint forces (combatant commanders, commanders of subunified commands, or commanders of joint task forces (JTFs)).
3. Support or are supported by joint forces (combatant commands, subunified commands, JTFs, component commands, Services, and supporting agencies).<sup>5</sup>

Joint Pub 1-01 also requires that "joint doctrine will be written to reflect extant capabilities" and that when "developing joint doctrine and JTTP, **extant Service and multinational doctrine and tactics, techniques, and procedures will be considered**"[emphasis added].<sup>6</sup> In addition, Joint Chiefs of Staff (JCS) Publication 2 requires each of the military services to "ensure that its doctrine and procedures are consistent with joint doctrine established by the Chairman of the Joint Chiefs of Staff."

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<sup>4</sup>Ibid.

<sup>5</sup>Ibid., I-1-2.

<sup>6</sup>Ibid. I-2.

This publication also requires that all joint doctrine will be "coordinated with the Services, Unified and Specified Commands, and Joint Staff."<sup>7</sup>

Under the Goldwater-Nichols DOD Reorganization Act of 1986, the Chairman of the Joint Chiefs of Staff is responsible for "developing doctrine for the joint employment of the armed forces."<sup>8</sup>

#### Evaluation Criteria for the Development of Joint Doctrine for NLWs

From this general description of the purpose and functions of joint doctrine, three criteria were identified in order to evaluate the specific requirement for joint doctrine for NLWs:

1. Does nonlethal technology provide a significantly new military operational capability to achieve U.S. strategic objectives?
2. Is there a critical void in extant joint, service and multiservice doctrine relating to the employment of nonlethal technology?
3. Will joint doctrine for NLWs enhance the combat effectiveness of U.S. forces?

The remaining steps in the research process were dedicated to answering these three secondary research questions by collecting, organizing, describing, and interpreting data in terms of causes, consequences, and relationships.

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<sup>7</sup>Chairman of the Joint Chiefs of Staff, *Joint Pub 1-01.1 Compendium of Joint Publications* (Final Coordination) (Washington, DC: U.S. Government Printing Office, 30 October 1998), A-2.

<sup>8</sup>Ibid.



## U.S. Armed Forces Capability Requirements

To determine whether NLWs provide the armed forces of the U.S. with any new military operational capabilities, it is necessary to first identify the requirements of the NSS and the NMS. Using the most recent NSS and NMS as well as *JV 2010* as references, strategic objectives and concepts will be identified, followed by an examination of the operational capabilities that the U.S. requires from its armed forces. These capability requirements will then become the standard against which nonlethal operational capabilities are measured.

## Current NLW RDT&E

A basic understanding of nonlethal technology is required in order to identify the operational capabilities that the technology provides to the armed forces of the U.S. This section will provide unclassified data on weapons systems, including a description of the weapons, technical characteristics, the potential military applications of the weapons, which service has the lead for requirements and acquisition of the weapons, current stage of development, and when available, projected fielding dates. Information on current NLW RDT&E was derived principally from the JNLWD.

## Current and Potential Operational Capabilities of NLWs

Armed with some of the technical information on nonlethal technology, the next step in the research process is to analyze the current and potential military capabilities of NLWs. This section includes descriptions of the broad nonlethal capability categories (counterpersonnel and countermateriel) as well as the more specific operational

capabilities that nonlethal technology can provide. In order to examine current and potential operational capabilities, this study used after-action reports from recent military operations in which NLWs were employed, scenarios described in several previous studies and the *Joint Concept for Non-Lethal Weapons*, and technical data provided by the JNLWD.

#### Comparative Analysis of Operational Capabilities of NLWs versus Armed Forces Capability Requirements

This step in the research methodology provides a means to answer the first evaluation criteria: Does nonlethal technology provide a significantly new military operational capability to achieve U.S. strategic objectives? The analysis is focused on determining any relationships, trends, or disparities between requirements and capabilities. The results of this comparative analysis will be described in detail and the results summarized in a matrix format.

#### Published Joint, Service, and Multiservice Doctrine and TTP Relating to the Operational Employment of Nonlethal Technology.

The purpose of this step is to address the second evaluation criteria of this study: Is there a critical void in extant joint, service and multiservice doctrine relating to the employment of nonlethal technology? This is a necessary, but not a sufficient, criterion for the development of joint doctrine for NLWs. As noted in chapter 1, joint doctrine for NLWs has not been published. However, joint doctrine is only one of several possible methods used to address key warfighting voids. A separate, "stand-alone" joint doctrine for NLWs may not be required if the information derived from several different joint, service, and multiservice doctrinal and TTP publications is compatible with the

emergence of nonlethal technology. The analysis contained in this stage of the research process identifies critical doctrinal deficiencies that potentially could be addressed by joint doctrine for NLWs.

#### Evaluate the Data Collected Against the Criteria for Joint Doctrine.

This is the final and most important step of the research methodology. The data that has been collected, organized, and described according to the outline presented in this chapter will be interpreted in order to determine the degree to which the three evaluation criteria have been met. With this information, the primary research question can be answered, conclusions can be drawn, and recommendations made.

This chapter provided the methodology to be used in researching the requirement for joint doctrine for NLWs. The descriptive and qualitative analysis approach used in this study is designed to answer the primary research question, Do the armed forces of the U.S. need joint doctrine for NLWs? as well as several secondary questions. The outcomes of this research methodology will be described in chapter 4.

## CHAPTER 4

### ANALYSIS

The purposes of this chapter are to present the outcomes of the research conducted for this study and to relate these results to one another in order to draw conclusions as to whether the armed forces of the U.S. need joint doctrine for NLWs. Based on the research methodology described in chapter 3, this chapter will present results in five major areas:

1. Armed forces capability requirements.
2. Current NLW RDT&E.
3. Current and potential operational capabilities of NLWs.
4. A comparison of the operational capabilities of NLWs with armed forces capability requirements.
5. Published joint, service, and multiservice doctrine and TTP relating to the operational employment of nonlethal technology.

After analyzing these findings, this chapter will consolidate and evaluate the data from these five areas against the three criteria for joint doctrine development described in chapter 3.

#### Armed Forces Capability Requirements.

In order to determine whether there is a need for joint nonlethal doctrine, the first question that must be answered is, Does nonlethal technology provide a significantly new military operational capability to achieve U.S. strategic objectives? Before examining nonlethal capabilities, it is important to understand the ends, ways, and means of national

military strategy. U.S. national military objectives are the “ends” of national military strategy and directly support the President’s national security strategy. As stated in the 1997 *National Military Strategy of the United States*, the national military objectives are to “promote peace and stability and, when necessary, to defeat adversaries.”<sup>1</sup>

The “ways” by which the military pursues these objectives are through the application of “four strategic concepts that govern the use of our forces to meet the demands of the strategic environment.”<sup>2</sup> These strategic concepts are strategic agility, overseas presence, power projection, and decisive force.<sup>3</sup> Based on these strategic concepts, *JV 2010* describes four operational concepts--dominant maneuver, precision engagement, focused logistics, and full-dimensional protection. Guided by these strategic and operational concepts, military forces conduct a variety of missions in support of national objectives. In August 1996, the Office of the Assistant Secretary of Defense for Special Operations and Low Intensity Conflict (Policy Planning) prepared a report listing the potential missions where NLWs might be employed.<sup>4</sup> The results of that report formed the basis for the preparation of table 1:

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<sup>1</sup>Chairman of the Joint Chiefs of Staff, *National Military Strategy*, 2.

<sup>2</sup>*Ibid.*, 3.

<sup>3</sup>*Ibid.*

<sup>4</sup>Coppernoll, 115.

Table 1. Potential Missions for U.S. Military Forces

<b>MILITARY OPERATIONS OTHER THAN WAR</b>	<b>MAJOR THEATER WAR</b>	<b>EMERGING MISSIONS</b>
Peace Operations	Rear Area Operations	Counter weapons of mass destruction (WMD)
Riot/Crowd Control	Protection of Key Installations	Denial of Enemy Base Areas
Civil Affairs Public Safety Operations	Population and Resources Control	Clandestine WMD Sterilization Operations
Cease-Fire Enforcement/Border Control	Prisoner of War Operations	Disclosure of WMD and Related Technology Possession or Manufacture
Enforcement of Sanctions	<b>Forcible Entry Operations</b>	<b>Counterdrug Operations</b>
Establishment and Supervision of Protected Zones	Advance Force Operations	Extraterritorial Abduction of Terrorists or Drug Lords
Forcible Separation of Belligerents	Facilities Seizure (airfields, ports, etc.)	Production Facility Denial
Guarantee and Denial of Movement	Airborne Assault	<b>Counterterrorism</b>
Interposition Operations	Amphibious Assault	Protection of Personalities
Protection of Humanitarian Assistance Efforts	Airmobile Assault	Hostage Release
Countersniper Operations	<b>Psychological Operations</b>	
<b>Counterinsurgency</b>	Surface Psychological Operations	Homeland defense
Counter guerrilla Operations	Airborne Psychological Operations	Theater ballistic and cruise missile defense
Isolation of Insurgents from Support	<b>Interdiction Operations</b>	
Counterambush	Destruction/Disablement of Enemy Shipping and Ports	
Air-Delivered Suppressive Fire	Joint Precision Interdiction Operations	
<b>Insurgency</b>	Surface Interdiction of the Enemy Rear	
Ambush	<b>Sea Control</b>	
Insurgency Support	Sea Denial	
	Destruction or Neutralization of Enemy Ships, Submarines, and Mines	
	Conduct of Barrier Operations in Ocean Choke Points	
	<b>Operations in the Enemy Rear</b>	
	Attack on Enemy Logistics	
	Attack on Enemy Command, Control, and Communications Facilities	
	Evasion and Escape	
	Airborne Personnel Recovery	
	Aerial and Surface Raids	
	Clandestine Air Infiltration	

	Exfiltration and Supply	
	Maritime and Riverine Sabotage	
	Industrial Sabotage	
	Military and Aviation Sabotage	
	Equipment Seizure Operations	
	Special Reconnaissance	
	Surface Infiltration and Exfiltration of Agents, Equipment, and Personnel	
	Air Surveillance	
	<b>Attack</b>	
	Electronic Attack	
	Pursuit	
	Riverine Assault	
	Strategic Attack	
	Suppression of Enemy Air Defenses	
	Close Air Support	
	Ground Attack	
	Movement to Contact	
	Exploitation	
	Offensive Counterair Missions	
	Offensive Counterspace Missions	
	<b>Defense</b>	
	Defensive Counterspace Missions	
	Defensive Countersir Missions	
	Counterpursuit/Disengagement	
	Countermechanized Operations	
	Barrier, Obstacle, and Mine Warfare Operations	
	Mobile Defense	
	Area Defense	
	Air Defense	
	<b>Ancillary Operations</b>	
	Beach, Riverine and Coastal Reconnaissance	
	Special Activities (Covert Operations)	
	Urban Operations	
	Air Reconnaissance	
	Surface Reconnaissance	
	<b>Retrograde Operations</b>	
	Covering-Force Operations	
	Withdrawal	
	Delay	
	Retirement	

Source: Coppemoll, 117; originally reported in Timothy J. Hannigan, Lori Raff, and Rod Paschall, "Mission Applications of Non-Lethal Weapons," *Report for Office of the Assistant Secretary of Defense for Special Operations and Low Intensity Conflict (Policy Planning)*, August 1996, 6.

From the strategic and operational concepts contained in the *NSS*, *NMS*, and *JV 2010*, and from an analysis of potential missions for U.S. military forces, the “means” of national military strategy--the broad range of capabilities that are required from the armed forces of the U.S. to achieve national objectives--can be derived. This study will use the following required operational capabilities against which to measure the capabilities provided by NLWs:

Defend the U.S. homeland

Respond across the spectrum of crisis (flexible deterrent options, military operations other than war (MOOTW), smaller-scale contingencies (SSC), and major theater war (MTW)).

Maintain strategic deterrence/preemption (conventional and nuclear)

Conduct decisive operations (conduct and sustain operations that accomplish U.S. objectives, promote post-conflict stability, and prevent recurrence of conflict)

Provide a forcible entry capability (air and sea)

Conduct special operations

Provide full-dimensional force/site protection

Counter asymmetric threats (weapons of mass destruction (WMD), terrorism, and narcotrafficking)

Provide focused logistics (tailored logistics packages to meet operational and tactical requirements in any environment)

Conduct information operations (IO) (integrate critical information and deny the same to an adversary)<sup>5</sup>

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<sup>5</sup>Chairman of the Joint Chiefs of Staff, *National Military Strategy*, 24-27.



In the next two sections, the specific NLWs that are either currently fielded or under development and the capabilities that these weapons can potentially provide to the armed forces will be examined. These nonlethal capabilities will then be compared to the operational requirements listed above to determine if NLWs provide a significantly new joint capability to the armed forces of the U.S.

### Current NLW RDT&E

This section will outline the major NLW programs that are either currently funded or are still in the concept exploration stage. This section will include data on weapons systems (including a description of the weapon, technical characteristics, and the potential military applications of the weapon), which service has the lead for requirements and acquisition of the weapon, current stage of development and, when available, projected fielding dates. As noted in chapter 1, only unclassified descriptions and capabilities are provided in this study. All programs are multiservice except as noted. Unless otherwise noted, the following descriptions of NLWs were compiled from sources provided by the JNLWD.<sup>6</sup>

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<sup>6</sup>Department of Defense Joint Non-Lethal Weapons Program, "A View to the Future"; Department of Defense, *Joint Non-Lethal Weapons Program, 1997--A Year in Review* (Quantico, VA: Joint Non-Lethal Weapons Directorate, February 1998), 7-20; Department of Defense, *Joint Non-Lethal Weapons Program 1998--A Year of Progress* (Quantico, VA: Joint Non-Lethal Weapons Directorate, February 1999), 5-14; *Joint Non-Lethal Weapons Directorate News* 1, no. 7 (August 1998); *Joint Non-Lethal Weapons Directorate News* 2, no. 1 (November 1998): 3-4; *Joint Non-Lethal Weapons Program News* 2, no. 2 (February 1999): 3-5; and Department of Defense, *Joint Non-Lethal Weapons Program NLW Master Plan (Draft)* (Washington, DC: Headquarters, U.S. Marine Corps, October 1998), 3-7 - 3-19.

## Currently Funded Programs

### Acquisition Programs

These are programs for which operational requirements documents (ORD) have been signed.

Modular Crowd Control Munition (MCCM). The MCCM is a "nonlethal variant of the Claymore [anti-personnel] mine."<sup>7</sup> Its 600 rubber ball blunt impact munitions are propelled by a half-ounce of explosives at 300 feet per second. The MCCM is manually detonated and its blast area extends out in a 45-degree arc to a maximum effective range of 15 meters. It is considered lethal if fired at personnel closer than 5 meters. It can be fired from the ground or mounted on a vehicle.<sup>8</sup> The MCCM ground emplacement version (MCCM (GE)) can be used for perimeter defense in crowd control scenarios while the MCCM vehicle-mounted system (MCCM (VMS)) will be mounted on High Mobility Multipurpose Wheeled Vehicles (HMMWV) and five-ton trucks to protect moving convoys, equipment, and facilities, as well as to disperse hostile crowds.

Milestone (MS) I/II of the Joint Service Acquisition Program was reached in November 1998.<sup>9</sup> MS III (Production Decision for the munition only) is planned for FY99.

Procurement by the Army is scheduled to commence in FY99 and by the Marine Corps

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<sup>7</sup>Department of Defense, "MCCM Milestone I/II Decision," *Joint Non-Lethal Weapons Program News* 2, no. 2 (February 1999): 3.

<sup>8</sup>C. Mark Brinkley, "New mine provides alternative to deadly force," *Marine Corps Times*, 15 March 1999, 20.

<sup>9</sup>Department of Defense, "MCCM Milestone I/II Decision," *Joint Non-Lethal Weapons Program News* 2, no. 2 (February 1999): 3.

and Air Force in FY00. An Initial Operational Capability (IOC) is required in FY00.<sup>10</sup>

The U.S. Army is the lead service for requirements and acquisition.<sup>11</sup>

Portable Vehicle Immobilization System (PVIS). The PVIS is a pre-emplaced system capable of stopping a vehicle (up to 7500 pounds), traveling at speeds up to 45 miles per hour without permanent injury to the vehicle occupants. The PVIS deploys in a manner similar to an aircraft arresting gear system and is designed to prevent the vehicle's occupants from escaping through the doors. The system will be HMMWV portable and capable of being assembled by three persons within two hours. The PVIS will provide military forces with an area denial capability, assist in the enforcement of roadblock operations, improve local area security, and protect individuals and units. Following a twelve month Engineering and Manufacturing Development (EMD) phase, MS III is scheduled for fourth quarter FY99. Production will commence in FY00 with a required IOC of FY01 and a Fully Operational Capability (FOC) of FY03.<sup>12</sup> The U.S. Army is the lead service for requirements and acquisition, with the Marine Corps and the Air Force as participating services.<sup>13</sup>

Nonlethal Crowd Dispersal Cartridge (NLCDC). This program will field a direct fire, non-shrapnel producing, blunt trauma round for the M203 40mm grenade launcher. With an effective range of 15-30 meters, this munition can be used for crowd control and

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<sup>10</sup>Department of Defense, *Joint Non-Lethal Weapons Program 1998--A Year of Progress*, 5; and *Joint Non-Lethal Weapons Program NLW Master Plan (Draft)*, 3-12.

<sup>11</sup>Department of Defense, *Joint Non-Lethal Weapons Program NLW Master Plan (Draft)*, B-1.

<sup>12</sup>Department of Defense, *Joint Non-Lethal Weapons Program 1998--A Year of Progress*, 6; and *Joint Non-Lethal Weapons Program NLW Master Plan (Draft)*, 3-12.

<sup>13</sup>Department of Defense, *Joint Non-Lethal Weapons Program NLW Master Plan (Draft)*, B-1.

vehicle protection. The rubber ball projectiles contained within each cartridge will impact multiple individuals (4 -5) closely grouped with sufficient force to deter, delay, and/or distract the targeted group of individuals. Following a successful combined MS I/II in FY99, an eighteen month EMD phase is scheduled. The program will be presented to the Army's Milestone Decision Authority in FY01 for an MS III (Production) decision. The Army, Marine Corps, Air Force, and USSOCOM have indicated intent to procure the NLCDC beginning in FY00. An IOC in FY01 and a FOC in FY03 are required.<sup>14</sup> The U.S. Army is the lead service for requirements and acquisition.<sup>15</sup>

Bounding Nonlethal Munition (BNLM). This program will provide a nonlethal area denial munition for site security and perimeter defense that is similar to the bounding anti-personnel mine. Potential payloads include blunt trauma (rubber balls), a sting net, and a personal dye marker. Each of the three variants will be tripwire activated and will produce an audible alert signal to friendly forces within a minimum range of 200 meters. The marking payload will allow for friendly forces to distinguish transgressors of defended areas from a minimum distance of 100 meters. The bounding net munition will entangle intruders within a ten to twenty meter area centered from the munition. MS I/II/II decisions are anticipated in FY99. The Army and the Marine Corps intend to procure this system commencing in FY01. A required IOC is first quarter FY01 with the

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<sup>14</sup>Department of Defense, *Joint Non-Lethal Weapons Program 1998--A Year of Progress*, 6; *Joint Non-Lethal Weapons Program NLW Master Plan (Draft)*, 3-11; and *Joint Non-Lethal Weapons Program 1998--A Year of Progress*, 6.

<sup>15</sup>Department of Defense, *Joint Non-Lethal Weapons Program NLW Master Plan (Draft)*, B-1.

required FOC in FY02.<sup>16</sup> The U.S. Army is the lead service for requirements and acquisition.<sup>17</sup>

Canister Launched Area Denial System (CLADS). This system will create a rapidly deployed barrier/deterrent fired from the HMMWV-mounted Volcano Mine Dispenser at standoff distances, deploying nonlethal area denial munitions against personnel and vehicles. Intended capabilities include a Volcano-dispensed, rapidly erected barrier (2-4 meters in diameter and 5-10 meters in length) of concertina-type wire and emplacement of a family of nonlethal barriers in less than 10 minutes from standoff distances. The existing Volcano launcher rack will be reduced to 20 canisters (from 60-80) and will allow the dispensing of other nonlethal payloads such as RCAs, BNLM, and/or marker munitions. A MS I decision is scheduled for second quarter FY99, MS II is scheduled for fourth quarter FY99 or early FY00, and MS III is expected in fourth quarter FY00.<sup>18</sup> The Army and the Marine Corps intend to procure the CLADS for their inventories. The U.S. Army is the lead service for requirements and acquisition.<sup>19</sup>

66mm Nonlethal Munitions. This project will provide a short-range, indirect fire, crowd control/area denial capability that can be used at standoff distances from the existing vehicle-mounted 66mm smoke dispensing systems (Light Vehicle Obscurant Smoke System [LVOSS]). Potential munitions include a blunt trauma munition and a

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<sup>16</sup>Department of Defense, *Joint Non-Lethal Weapons Program NLW Master Plan (Draft)*, 3-13; and *Joint Non-Lethal Weapons Program 1998--A Year of Progress*, 6 - 7.

<sup>17</sup>Department of Defense, *Joint Non-Lethal Weapons Program NLW Master Plan (Draft)*, B-1.

<sup>18</sup>Department of Defense, *Joint Non-Lethal Weapons Program NLW Master Plan (Draft)*, 3-14; and *Joint Non-Lethal Weapons Program 1998--A Year of Progress*, 7.

<sup>19</sup>Department of Defense, *Joint Non-Lethal Weapons Program NLW Master Plan (Draft)*, B-1.

distraction round. The blunt trauma round consists of approximately 450 thirty-two caliber rubber balls inside a rubber housing attached to metal base. The second munition is a flash bang round made of polyurethane material. The rubber ball grenades will eject rubber pellets while the flash bang device will create an audible and visible distraction. Both rounds are to have a range of 100-120 meters. The Army and the Marine Corps have indicated their intent to provide procurement funds in their Program Objective Memorandum (POM)-00 submission for production beginning in FY00.<sup>20</sup> The U.S. Army is the lead service for requirements and acquisition.<sup>21</sup>

Foam Applications. This program will "develop a capability to temporarily delay access to building openings in MOUT environments and/or temporarily disable selected equipment, vehicles, and weapons."<sup>22</sup> This program will field a dispensing system that will either be handheld or shoulder carried and can be used in a variety of applications involving area denial and countermaterial applications. An effort is underway to explore and develop fast-curing nonlethal rigid foams (NLRF) to seal off doors, windows, culverts, or other access points to keep people in or out of certain facilities/areas. The foam could also provide the ability to deactivate counterpersonnel mines or disable weapons. Slippery foams could potentially deny or delay pedestrian traffic in open areas; could possibly be used to deny access to facilities in a MOUT environment; could deny or delay vehicles by causing them to lose their traction. In January 1999, Marine Corps

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<sup>20</sup>Department of Defense, *Joint Non-Lethal Weapons Program NLW Master Plan (Draft)*, 3-14; and *Joint Non-Lethal Weapons Program 1998--A Year of Progress*, 7.

<sup>21</sup>Department of Defense, *Joint Non-Lethal Weapons Program NLW Master Plan (Draft)*, B-1.

<sup>22</sup>Department of Defense, *Joint Non-Lethal Weapons Program 1998--A Year of Progress*, 8.

Systems Command, the Milestone Decision Authority for the program, approved NLRP to proceed into the Program Definition/Risk Reduction phase of the Joint Service Acquisition Program.<sup>23</sup> MS II is scheduled for fourth quarter FY00, and MS III is expected in second quarter FY01. An IOC of FY01 and a FOC of FY02 are anticipated.<sup>24</sup> The Army and Marine Corps will include procurement funds in their POM-00 submission for production beginning in FY02.<sup>25</sup> The Marine Corps is the lead service for requirements and acquisition.<sup>26</sup>

#### Non-Acquisition Programs

These are programs that have not achieved MS I. This category includes Concept Exploration Programs and Pre-MS 0 Programs.<sup>27</sup>

Vessel Stopper System (VSS). This program will develop and field a new device that will disable the communication/navigation systems, electrical control systems, or engine/propulsion systems of surface vessels at sea without seriously injuring the occupants. The potential use of the VSS is with the Maritime Prepositioning Forces, joint Maritime Intercept Operations, and special operations. This system is being developed at the Naval Surface Warfare Center (NSWC), Dahlgren, Virginia. The Navy, Marine Corps, and Army have expressed support for this program; however, it is anticipated that

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<sup>23</sup>Department of Defense, "Non Lethal Rigid Foam Milestone I Decision," *Joint Non-Lethal Weapons Program News* 2, no. 2 (February 1999): 3.

<sup>24</sup>Department of Defense, *Joint Non-Lethal Weapons Program 1998--A Year of Progress*, 8.

<sup>25</sup>Department of Defense, *Joint Non-Lethal Weapons Program NLW Master Plan (Draft)*, 3-15; and *Joint Non-Lethal Weapons Program 1998--A Year of Progress*, 8.

<sup>26</sup>Department of Defense, *Joint Non-Lethal Weapons Program NLW Master Plan (Draft)*, B-1.

<sup>27</sup>*Ibid.*, 3-15.

only the Navy will include procurement funds in the near term.<sup>28</sup> Projected MS I/II in FY02, MS III in FY03.<sup>29</sup> The U.S. Navy is the lead service for requirements.<sup>30</sup>

Unmanned Aerial Vehicle Nonlethal Payload/Delivery System (UAV-NL). This program is an effort to integrate the ALE-47 aircraft chaff flare dispensing system onto current UAVs. This system is being developed to provide the capability to dispense nonlethal payloads, to include tear gas, malodorants, pyrotechnics, and caltrops. Final demonstration testing was conducted in FY98 by NSWC.<sup>31</sup> "This program is in a "holding action" awaiting Joint Requirements Oversight Council (JROC) clarification of tactical and/or vertical take-off and landing (VTOL) platform issues. The Army and the Marine Corps are examining potential VTOL systems to replace the Pioneer that will incorporate NLW dispensing requirements."<sup>32</sup> The U.S. Marine Corps is the lead service for requirements and the U.S. Navy is the lead service for acquisition.<sup>33</sup>

Ground (Electric) Vehicle Stopper (GVS). This program will develop and field a device that will deliver electromagnetic radiation at high-power levels from a ground-based microwave source. This system can be used to selectively stop moving vehicles without causing permanent damage or injury to personnel. This project is currently in the concept exploration phase at the Army Research Laboratory (ARL) in Adelphi,

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<sup>28</sup>Department of Defense, *Joint Non-Lethal Weapons Program NLW Master Plan (Draft)*, 3-16; and *Joint Non-Lethal Weapons Program 1998--A Year of Progress*, 8 - 9.

<sup>29</sup>Department of Defense, *Joint Non-Lethal Weapons Program 1998--A Year of Progress*, 10.

<sup>30</sup>Department of Defense, *Joint Non-Lethal Weapons Program NLW Master Plan (Draft)*, B-1.

<sup>31</sup>*Ibid.*, 3-13.

<sup>32</sup>Department of Defense, *Joint Non-Lethal Weapons Program 1998--A Year of Progress*, 9.

<sup>33</sup>Department of Defense, *Joint Non-Lethal Weapons Program NLW Master Plan (Draft)*, B-1.



Maryland.<sup>34</sup> MS I projected for FY00, MS II in FY02 and MS III in FY04.<sup>35</sup> The U.S. Army is the lead service for requirements.<sup>36</sup>

Acoustics. This program will develop acoustic source generators to achieve specific debilitating biological effects (nausea, loss of bowel control, disorientation, vomiting, and potential internal organ damage)<sup>37</sup> on the target at standoff ranges. During FY98, target effects studies were conducted and a variety of combustion- and electrically- driven acoustic sources were evaluated for potential application. Target effects demonstrations are scheduled for FY99. MS I is projected for FY02, MS II in FY03, and MS III in FY05.<sup>38</sup> The U.S. Army is the lead service for requirements.<sup>39</sup>

#### Technology Investment Program

The Technology Investment Program (TIP) was established “for the purpose of funding short (1-2 year) initiatives with specific deliverables in supporting gaps identified relative to the core capabilities for NLWs.”<sup>40</sup> In 1998, three TIPs were funded:

Odorous Substances. This project “will develop a comprehensive matrix of distinctive odors related to specific populations and/or geographic areas. Some odors will be repulsive to the local populace, while others would perhaps be attractive or merely

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<sup>34</sup>Department of Defense, *Joint Non-Lethal Weapons Program 1998--A Year of Progress*, 9.

<sup>35</sup>*Ibid.*, 10.

<sup>36</sup>Department of Defense, *Joint Non-Lethal Weapons Program NLW Master Plan (Draft)*, B-1.

<sup>37</sup>Bunker, 3.

<sup>38</sup>Department of Defense, *Joint Non-Lethal Weapons Program 1998--A Year of Progress*, 10.

<sup>39</sup>Department of Defense, *Joint Non-Lethal Weapons Program NLW Master Plan (Draft)*, B-1.

<sup>40</sup>Department of Defense, *Joint Non-Lethal Weapons Program 1998--A Year of Progress*, 11.

indicate something significant such as a leak of flammable material. The matrix or "catalog will serve to match odors to regions in order to obtain desired target effects."<sup>41</sup>

Spider Fiber Entangler. This program investigated the feasibility of using a new high strength, very elastic, light weight fiber for nonlethal applications. This fiber could be used as an entangling device to disable vehicles, foul rudders and propellers, and stop fan blades. The effort experienced difficulties in obtaining the required quantities of natural or artificial spider silk, but future advancements in technology may overcome these barriers.<sup>42</sup>

Nonlethal Electromagnetic Pulser (NEMP). This project was "designed to explore technology that would disable electronic components in computers and other devices, as well as civilian vehicles."<sup>43</sup> Large transient currents generated by exposure to an intense electromagnetic pulse disable the electronic components of the intended target. This effect is achieved by using a portable, battery-powered Marx generator and EMP antenna/coupling mechanism. NEMP was terminated in FY98 due to lack of performance.<sup>44</sup>

In 1998, from among 82 white papers submitted from academic, industry, and government organizations in response to a Broad Agency Announcement, the JNLWD selected the following proposals for FY99 funding:<sup>45</sup>

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<sup>41</sup>Ibid., 12.

<sup>42</sup>Ibid.

<sup>43</sup>Ibid.

<sup>44</sup>Ibid.

<sup>45</sup>Ibid.

Pulsed Chemical Laser. This proposal by Mission Research Corporation will examine the feasibility of a tunable weapon with anti-personnel effects. The objective is to produce nonlethal effects on personnel at a range of hundreds of meters. The effect is the equivalent of delivering a massless, shrapnel-less blunt impact on the surface of the target.<sup>46</sup>

Nonlethal 81mm mortar round. United Defense, ARL, and the Edgeworth Research Development and Engineering Center, Aberdeen Proving Grounds, Maryland will conduct this project.<sup>47</sup> The proposal is for the use of mortars to deliver nonlethal payloads to cause disorientation, distraction, and/or loss of visual and auditory ability among personnel in the targeted area. The anticipated design will focus on a projectile that will deliver a long duration acoustic generator producing noise in excess of 130 decibels, while dispersing an extremely dense smoke. The smoke passes energy in the infrared range, allowing personnel with night vision goggles to see through it.<sup>48</sup>

Frangible Mortar Casing. "This program will investigate the potential for molded felted fiber to be used as a frangible casing material" for the 120mm high explosive mortar round.<sup>49</sup>

Overhead Chemical Agent Dispersion System (OCADS). "This proposal offers the ability to rapidly disperse nonlethal chemical agents over large areas. The dispersed

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<sup>46</sup>Ibid.; and Department of Defense, "Pulsed Chemical Laser Proposal Selected for TIP Funding," *Joint Non-Lethal Weapons Program News* 2, no. 1 (November 1998): 4.

<sup>47</sup>Department of Defense, "United Defense, ARL, and ERDEC to Team-Up and Develop Non-Lethal Mortar Round!!!" *Joint Non-Lethal Weapons Program News* 2, no. 1 (November 1998): 4.

<sup>48</sup>Department of Defense, *Joint Non-Lethal Weapons Program 1998--A Year of Progress*, 13.

<sup>49</sup>Department of Defense, "TIP Solicitation Completed," *Joint Non-Lethal Weapons Program News* 2, no. 2 (February 1999): 4.

agents can be used for crowd control or to provide a remotely generated protective barrier. The OCADS technology is readily adaptable to a wide range of munition sizes ranging from hand held (i.e., M203 grenade launchers) to mortars.”<sup>50</sup> The system is designed to be compatible with the M871A1 Volcano Tube Launcher System but can also be deployed from individual launcher tubes or the CLADS systems.

NLW Guided Projectile. “The objective of this effort is to explore the feasibility of applying guided projectile technologies to provide long-range delivery and deployment of nonlethal weapons.”<sup>51</sup>

Microcapsules. This project will investigate the potential for polymeric microcapsules to be used for delivery of nonlethal chemicals in crowd control situations. It is an alternative to blunt trauma munitions such as rubber bullets and it makes feasible the use of marker dyes to identify participants. Advantages over current delivery systems include the ability to project a liquid farther, control dispersion, and prevent redirection by opponents.<sup>52</sup>

Airborne Tactical Laser (ATL). This project will conduct “a feasibility study to assess capabilities for an ATL to conduct nonlethal warfare.”<sup>53</sup> The advantages of this system are the ability to provide standoff ranges when conducting nonlethal engagements against materiel targets.<sup>54</sup>

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<sup>50</sup>Ibid.

<sup>51</sup>Department of Defense, *Joint Non-Lethal Weapons Program 1998--A Year of Progress*, 13.

<sup>52</sup>Ibid., 14.

<sup>53</sup>Department of Defense, “TIP Solicitation Completed,” *Joint Non-Lethal Weapons Program News* 2, no. 2 (February 1999): 5.

<sup>54</sup>Department of Defense, *Joint Non-Lethal Weapons Program 1998--A Year of Progress*, 14.

## Other DOD NLW Efforts

Marine Corps NLW Capability Sets. The Marine Corps has fielded fourteen sets, intended for use by Marine Expeditionary Units (MEU) (Special Operations Capable (SOC)). These sets, which support up to 200 Marines, include blunt impact munitions for the 12 gauge shotgun and 40mm M203 grenade launcher, diversionary devices, caltrops, riot batons, Xenon searchlights, restraints, OC dispensers, and personnel protective equipment such as riot face shields. Ten additional sets are planned for fielding in the year 2000.<sup>55</sup>

Army NLW Capability Sets. In FY00, the Army plans to begin purchase of thirty NLW capability sets. These sets will include riot face shields, riot body shields, wooden batons, Xenon, searchlights, OC dispensers, riot control dispensers, 12 gauge shotguns, 40mm sponge grenade rounds, 40mm area and point rounds, 5.56 area and point rounds, hand thrown dye markers, hand grenade stingball, stun hand grenades/flash bang device, LVOSS, LVOSS 66mm canister (stingball), MCCM, and PVIS.<sup>56</sup>

Under Barrel Tactical Payload System (UBTPS). This program, a U.S. Army DBBL NLW experiment "evaluated the utility of taking Commercial Off The Shelf (COTS) paintball technology for tactical use as a NLW."<sup>57</sup> This system is intended to be mounted under the barrel of the existing M16A2 rifle and M4 carbine "to provide a multi-shot, rapid fire, nonlethal direct-fire capability from ranges of 20 to 100 meters. The system will operate on compressed air and will not degrade the capabilities of the

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<sup>55</sup>Department of Defense, *Joint Non-Lethal Weapons Program NLW Master Plan (Draft)*, 2-6.

<sup>56</sup>Ibid.

<sup>57</sup>Department of Defense, *Joint Non-Lethal Weapons Program 1998--A Year of Progress*, 17.

M16A2/M4. The program is an Advanced Concept and Technology II (ACT II) effort executed by TECOM-Armament Research, Development and Engineering Center on behalf of the DBBL. After the ACT is concluded, the program will be presented to the JNLWD for further presentation of the program to the military services for consideration for adoption as a jointly funded NLW acquisition program.”<sup>58</sup>

Saber 203 Laser Illuminator (U.S. Air Force and OSD Physical Security Equipment Action Group (PSEAG)). This laser illuminator is a rifle-mounted, eye-safe, glare producing dazzling light that has ranges beyond the maximum effective range of the M16’s 5.56 millimeter capability. This weapon will cause disorientation and distraction of personnel in facility protection scenarios.<sup>59</sup>

Minimum Signature Envelope Recoilless (MISER) Gun (U.S. Army). An 81mm, shoulder-fired weapon with a range of 200 meters and a 5-meter backblast area, designed to knock down doors and fire nonlethal munitions. Uses a liquid propellant (instead of propulsion gases) to eject the munition, resulting in no flash and very little noise. “The system’s warhead is attached with a ‘bayonet connector’ which makes it easier to change in the field.”<sup>60</sup>

Electromagnetic weapons and DEW. Examples of this category of weapons include “radio frequency weapons, high-power microwaves, lasers, and optical

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<sup>58</sup>Department of Defense, *Joint Non-Lethal Weapons Program NLW Master Plan (Draft)*, 3-5.

<sup>59</sup>Department of Defense, *Joint Non-Lethal Weapons Program 1997--A Year in Review*, 20.

<sup>60</sup>George I. Seffers, “Army dusts off nonlethal door-busting weapon,” *Navy Times*, 14 September 1998, 37.

munitions.”<sup>61</sup> One NLW in this category is the “Dazzler,” an “intense, spotlight-style device designed to illuminate the entire side of a building, temporarily blinding snipers in windows and preventing them from acquiring targets.” This weapon is currently in the prototype stage.<sup>62</sup> A DEW called the “Penetrator” “fires a blast of microwave energy through the walls of a building, nauseating the occupants and immobilizing them for up to 20 minutes.”<sup>63</sup> The specific characteristics of this weapon are still classified and will not be available until 2005–2006. A third DEW is the “Barrier,” whose details are also still classified. In general, the Barrier “uses sound to make combatants feel ill and uncomfortable when near it.”<sup>64</sup>

#### Current and Potential Operational Capabilities of NLWs

From an analysis of the available literature relating to nonlethal technologies, particularly the *Joint Concept for Non-Lethal Weapons*, the *NLW Master Plan*, and DODD 3000.3, nine antipersonnel and three antimateriel capabilities or potential capabilities were identified. The JNLWP classifies nonlethal capabilities into two broad categories: counterpersonnel and countermateriel. In order for the reader to better understand these capabilities, a brief description of each is provided with examples of specific types of NLWs that could be employed to provide the capability, where

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<sup>61</sup>Robert J. Bunker, *Five Dimensional (Cyber) Warfighting: Can the Army After Next be Defeated Through Complex Concepts and Technologies?* (Carlisle Barracks, PA: U.S. Army War College Strategic Studies Institute, 10 March 1998), 11.

<sup>62</sup>C. Mark Brinkley, “A new take on the sound and the fury: Marines’ warfighting lab experiments with non-lethal energy weapons,” *Navy Times*, 21 December 1998, 18.

<sup>63</sup>*Ibid.*

<sup>64</sup>*Ibid.*

applicable. The common trend among these capabilities is that they fulfill one of the key operational concepts of *JV 2010* and the *NMS*--“precision engagement.” As a previous study has noted, “Precision entails limiting unintended or undesired effects, whether through accuracy or by weapons specifically designed to avoid such effects. . . . nonlethality also shows promise for limiting unintended or undesired effects, and for allowing military forces to attain a degree of psychological precision to complement physical precision.”<sup>65</sup>

### Counterpersonnel

“Nonlethal counterpersonnel capabilities allow for the application of deterrent measures while reducing the risk of fatalities or serious casualties on the target(s) and/or among non-combatants. . . . The goal for counterpersonnel NLW capabilities is to provide the mission commander a full spectrum of graduated responses, capable of being employed against personnel from safe standoff distances.”<sup>66</sup>

Incapacitation of personnel. NLWs provide the capability to incapacitate personnel, individually or in groups. “Incapacitation is achieved when weapons’ effects result in the physical inability (real or perceived) or mental disinclination to act in a hostile or threatening manner. NLWs incapacitation should be readily reversible; preferably self-reversing through the passage of time.”<sup>67</sup> An example of this capability would be the use of an acoustic weapon based on infrasound, fired from standoff

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<sup>65</sup>Lovelace and Metz, 1.

<sup>66</sup>Department of Defense, *Joint Non-Lethal Weapons Program NLW Master Plan (Draft)*, 2-2.

<sup>67</sup>*Ibid.*, 2-3



distances, to incapacitate a tank crew by causing uncontrollable nausea, loss of bowel control, and vomiting.<sup>68</sup> UAV-NL, UBTPS, Acoustics, Saber 203 Laser Illuminator, the Dazzler, and the Penetrator.

Area denial to personnel. This capability "can include the use of physical barriers or of systems that produce sufficient physical discomfort to deter entrance or to cause flight."<sup>69</sup> One potential application of nonlethal technology involves a scenario where U.S. military personnel are tasked to provide security for a food distribution point as part of a humanitarian relief operation. CLADS could be used to reinforce the perimeter and prevent crowds from attempting to force their way into the site. BNLM, CLADS, UAV-NL, Foam, Acoustics, Saber 203 Laser Illuminator, and the Barrier.

Crowd control. NLWs can provide a "means of influencing the behavior and activities of potentially hostile crowds, as well as the capability to bring a riotous mob under control."<sup>70</sup> MCCM, NLCDC, BNLM, UAV-NL, UBTPS, Acoustics, Saber 203 Laser Illuminator, and the Barrier.

Separate belligerents. In peacekeeping and peace enforcement operations, it is often essential to physically separate the parties to a conflict. A combination of "anti-personnel, anti-materiel, counter-mobility, and barrier systems can reduce the need to interpose U.S. forces between opposing factions."<sup>71</sup> UBTPS, Acoustics, Saber 203 Laser Illuminator, and the Barrier.

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<sup>68</sup>Bunker, *Five Dimensional (Cyber) Warfighting*, 12.

<sup>69</sup>Department of Defense, *Joint Non-Lethal Weapons Program NLW Master Plan (Draft)*, 2-3.

<sup>70</sup>*Ibid.*

<sup>71</sup>Lovelace and Metz, 22.

Hostage rescue/counterterrorism. Because of the need for precise application of force during these operations, nonlethal capabilities can be used to “incapacitate hostage takers and terrorists without inflicting more than temporary discomfort upon the hostages or the victims.”<sup>72</sup> An example of this capability is the use of the MISER Gun to silently knock down a door to a room inside a building and disable the hostage takers without destroying the entire building by using an explosive device. UBTPS, Acoustics, Saber 203 Laser Illuminator, MISER Gun, and the Penetrator.

Clearing facilities of personnel. NLWs can provide the capability to clear personnel from facilities and structures by making these facilities “temporarily uninhabitable or otherwise undesirable for human presence.”<sup>73</sup> An example of this capability is the use of a DEW to suppress belligerents inside a building while U.S. military personnel enter. UBTPS, Acoustics, Saber 203 Laser Illuminator, the Dazzler, and the Penetrator.

Limit escalation of violence. In many MOOTW scenarios (a peacekeeping mission, for example), U.S. military presence may actually incite rather than reduce tensions in a particular area or among a certain population. Prudent use of NLWs (in accordance with rules of engagement (ROE) and the requirements for force protection) could give the commander more options from which to choose when deciding on the level of force to use in a particular situation. While the commander doesn’t abrogate his right to use deadly force when necessary, the use of NLWs as a bridge between threats

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<sup>72</sup>Ibid., 29.

<sup>73</sup>Department of Defense, *Joint Non-Lethal Weapons Program NLW Master Plan (Draft)*, 2-3.

and deadly force may contribute to mission accomplishment by limiting the escalation of violence to nonlethal levels. All NLWs have the potential to provide this capability

Take military action when use of lethal force is not the preferred option. During military operations in a heavily populated urban area, U.S. personnel can use NLWs to protect the force by achieving standoff from hostile elements and reduce collateral damage and civilian casualties while still accomplishing the mission. All NLWs have the potential to provide this capability

Decrease post-conflict costs of reconstruction. In many situations, ranging from MTW to MOOTW, a policy objective may be to avoid environmental degradation or to “limit the scope and/or duration of the effects of war on an enemy” in order to facilitate post-war reconstruction and restoration of essential services.<sup>74</sup> In these situations, the use of NLWs could support that objective. Foam, Acoustics, Penetrator, and the Barrier.

### Countermateriel

“Nonlethal countermateriel capabilities render equipment and facilities unusable, but normally without complete destruction. . . . [and] without lethal effect on crew, passengers, or other personnel in the area. The goal for countermateriel NLW capabilities is to reduce or eliminate the enemy's ability to use his equipment and to do so from an acceptable standoff distance and in a less destructive manner than that normally associated with conventional use of military force.”<sup>75</sup>

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<sup>74</sup>Lovelace and Metz, 29.

<sup>75</sup>Department of Defense, *Joint Non-Lethal Weapons Program NLW Master Plan (Draft)*, 2-4.

Area denial to Vehicles and Vessels. Nonlethal capabilities can “deny land areas to wheeled, tracked, and surface-effects vehicles. It may include physical barriers, systems that render vehicles within the targeted area inoperable, and/or systems that artificially reduce the terrain's ability to support traffic. This denial of an area by non-lethal means also applies to grounded aircraft and possibly to seaspace or even airspace.”<sup>76</sup> PVIS, CLADS, GVS, and VSS.

Disable Vehicles, Aircraft, Vessels and Facilities. Provides a “nonlethal capability to disable and/or neutralize selected vehicles, aircraft, vessels, and facilities. . . . This capability also applies directly to the disabling of ships and other maritime vessels.”<sup>77</sup> One example of this capability is use of a “conventional round containing a pulsed electromagnetic warhead fired against a tank’s armor. The warhead would detonate against the tank releasing a high energy burst of short duration which would energize it and thereby fry all of its electrical components.”<sup>78</sup> GVS, VSS, Foam, and UAV-NL.

Discourage, delay or prevent hostile actions. NLWs such as the UAV-NL or the ATL could be used to launch a nonlethal preemptive countermateriel strike against a hostile force.

#### Comparison of Operational Capabilities of NLWs With Armed Forces Capability Requirements

By comparing the operational capabilities of NLWs with the required capabilities of the national military strategy, the question of whether nonlethal technology

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<sup>76</sup>Ibid.

<sup>77</sup>Ibid.

<sup>78</sup>Bunker, *Five Dimensional (Cyber) Warfighting*, 12.

provides U.S. military forces with a significantly new military operational capability can be addressed. The results of this comparison are summarized in table 2

Defend the U.S. homeland. Except in a MSCA role (an application of NLWs that was purposely not examined for this study), NLWs do not provide a homeland defense capability at this time.

Respond across the spectrum of crisis (flexible deterrent options, MOOTW, SSC, and MTW). The uses for NLWs across the spectrum of crisis are extensive. Because U.S. forces are almost certainly going to conduct “constrained” MOUT in MOOTW, SSC, and MTW scenarios, a MOUT mission will be used to demonstrate potential applications for NLWs. A unit with a mission to clear a building of hostile personnel could use an optical device such as the Dazzler or Saber 203 Laser Illuminator to temporarily blind any observation posts or snipers. U.S. personnel could then move into a position from which to employ additional nonlethal counterpersonnel weapons such as the UBTPS, Acoustics, or the Penetrator to suppress and incapacitate belligerents while clearing the building. Injuries suffered by noncombatants and damage to the building would be minimized, thus decreasing post-conflict costs of reconstruction, limiting the escalation of violence to nonlethal levels, and increasing support for U.S. military presence among the local population.

Maintain strategic deterrence/preemption (conventional and nuclear). Strategic deterrence and preemption often entail a breach of national sovereignty. Therefore, NLWs that offer a long-range, standoff capability may enable the U.S. to conduct a conventional, but a nonlethal, strike against an adversary while limiting collateral damage and injuries to innocent personnel. This attack could be retaliatory or it could be a

spoiling attack with the intent of delaying or preventing hostile action by incapacitating personnel for a specified period of time (possibly by using acoustics) or disabling equipment or facilities (through the use of the ATL NLRF, GVS, VSS, electromagnetic weapons, or DEW).<sup>79</sup>

Conduct decisive operations (conduct and sustain operations that accomplish U.S. objectives, promote post-conflict stability, and prevent recurrence of conflict). The use of NLWs can promote post-conflict stability by decreasing reconstruction costs. Depending on U.S. political objectives, a decisive operation to defeat an adversary may not require the physical destruction of his personnel and equipment but only their temporary incapacitation.

Provide a forcible entry capability (air and sea). In a non-permissive environment where U.S. military forces must be introduced into a foreign country (for example, a noncombatant evacuation operation (NEO) or a SSC), the capabilities of NLWs can be used to incapacitate hostile personnel and gain access to seaports, airfields and other critical facilities without destroying them. Nonlethal capabilities can thus decrease post-conflict costs of reconstruction.

Conduct special operations. Nonlethal capabilities that support special operations forces (SOF) missions include incapacitating personnel (counterterrorism), hostage rescue, disabling equipment and facilities (direct action, counterterrorism, counterdrug), delaying or preventing hostile actions (counterterrorism, direct action) and taking military action where lethal force is not the preferred option (psychological operations (PSYOPS)).

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<sup>79</sup>Scenario suggested by Lovelace and Metz, 27-28.

Provide full-dimensional force/site protection. Although force/site protection is equally critical in MOOTW, SSC, and MTW, a riot control scenario will be used as an example to demonstrate nonlethal protection capabilities that can be used across the spectrum of crisis. As part of a humanitarian assistance mission, U.S. military personnel are assigned to protect a large food distribution point. A large, but mostly unarmed, crowd besieges the distribution point attempting to obtain food. Several armed “agitators” belonging to a faction opposed to U.S. intervention are also among the crowd and begin firing at U.S. personnel. Rather than return fire with lethal weapons, the security force uses a combination of MCCM, NLCDC, BNLM, OCADS, UAV-NL, UBTPS, Acoustics, odorous substances and the Barrier to disperse the crowd.<sup>80</sup>

Counter asymmetric threats (WMD, terrorism, and narcotrafficking). The nonlethal capabilities described under strategic deterrence/preemption also apply to countering asymmetric threats. One study suggests that against WMD, NLWs could be used to disable electrical or electronic control systems, or deny access to storage areas through the use of nonlethal rigid foam, chemical, acoustic, or electronic systems.<sup>81</sup> As described in the previous section, NLWs such as the UBTPS, Acoustics, Saber 203 Laser Illuminator, and MISER Gun could be used in counterterrorism and hostage rescue scenarios.

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<sup>80</sup>Developed from scenarios presented in *A Joint Concept for Non-Lethal Weapons*, and Lovelace and Metz, 20-21.

<sup>81</sup>Lovelace and Metz, 28.

Provide focused logistics (tailored logistics packages to meet operational and tactical requirements in any environment). NLWs do not provide a capability that directly supports focused logistics.

Conduct IO (integrate critical information and deny the same to an adversary). As currently defined by DODD 3000.3, NLWs do not provide a capability that supports information operations. Although information operations may have nonlethal effects, they are excluded from the DOD definition of NLWs because such operations are not designed specifically for the purpose of minimizing fatalities, permanent injury to personnel, and undesired damage to property and the environment.

Table 2: Comparison of Operational Capabilities of Nonlethal Weapons  
With Armed Forces Capability Requirements

<div> <div>NLW OPERATIONAL CAPABILITIES</div> <div>JOINT FORCE REQUIREMENTS</div> </div>	INCAPACITATE PERSONNEL	DENY ACCESS TO PERSONNEL	CROWD CONTROL	SEPARATE BELLIGERENTS	HOSTAGE RESCUE	CLEAR FACILITIES	DISRUPT, DELAY, OR PREVENT HOSTILE ACTIONS	LIMIT ESCAPE	MILITARY ACTION WHERE LETHAL FORCE NOT PREFERRED OPTION	DECREASE POST-CONFLICT RECONSTRUCTION COSTS	AREA DENIAL	DISABLE EQUIP/FACILITIES
HOMELAND DEFENSE	--	--	--	--	--	--	--	--	--	--	--	--
RESPOND ACROSS CRISIS SPECTRUM	X	X	X	X	--	X	X	X	X	X	X	X
STRATEGIC DETERRENCE	X	X	--	--	--	--	X	X	X	--	X	X
DECISIVE OPERATIONS	X	X	--	--	--	X	--	X	X	X	X	X
FORCIBLE ENTRY	X	--	--	--	--	X	X	X	X	X	--	X
SPECIAL OPERATIONS	X	--	--	--	X	X	X	X	X	X	X	X
FORCE PROTECTION	X	X	X	X	X	X	X	X	X	X	X	X
COUNTER ASYMMETRIC THREATS	X	X	--	--	X	X	X	X	X	X	X	X
FOCUSED LOGISTICS	--	--	--	--	--	--	--	--	--	--	--	--
INFO OPERATIONS	--	--	--	--	--	--	--	--	--	--	--	--



Published Joint, Service, and Multiservice Doctrine and TTP  
Relating to the Operational Employment of Nonlethal Technology

As noted in chapter 1, the joint employment of NLWs is not among the subjects of the 109 joint TTP and doctrinal publications that either have been approved or are currently under development.<sup>82</sup> An electronic search of the JEL database using the keywords “nonlethal weapons” and “non-lethal weapons” yielded a total of twenty six documents that contained the term. Of over 300 documents that were searched, only eight joint doctrinal publications contained entries for NLWs. These publications are Joint Pub 1-02, *Department of Defense Dictionary of Military and Associated Terms*; Joint Pub 2-01, *Joint Intelligence Support to Military Operations*; Joint Pub 3-03, *Doctrine for Joint Interdiction Operations*; Joint Pub 3-07.2, *JTTP for Antiterrorism*; Joint Pub 3-09, *Doctrine for Joint Fire Support*; Joint Pub 3-12.1, *Doctrine for Joint Theater Nuclear Operations*; Joint Pub 3-55, *Doctrine for RSTA Support for Joint Operations*; and Joint Pub 3-56.1, *Command and Control for Joint Air Operations*.

The joint publications that reference NLWs either advocate the integration of lethal and nonlethal fires to achieve certain effects on a target or list NLWs as an option for the commander to use in certain situations. None of these publications, however, provide any specific guidance on the operational employment of nonlethal technology. For example, Joint Pub 3-09, *Doctrine for Joint Fire Support*, states that “nonlethal weapons effects include those from electronic warfare (EW), certain psychological operations (PSYOP) such as leaflet drops, some information operations (IO) such as

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<sup>82</sup>Chairman of the Joint Chiefs of Staff, *Joint Doctrine Hierarchy* (Joint Electronic Library [library on-line]; available from <http://www.dtic.mil/doctrine/index.html>; Internet; accessed 6 March 1999).

disrupting the enemy's information networks, and the use of munitions such as illumination, smoke, or incapacitating agents.”<sup>83</sup>

The appendix to this study is a compilation of additional DOD, joint, multiservice, and service publications that either directly or indirectly have some bearing on the employment of nonlethal technology, although the term “nonlethal weapons” is not specifically mentioned in many of these publications. Among the non-doctrinal publications related to NLWs are DODD 3000.3, *Policy for Non-lethal Weapons*; a JNLWP concept paper; *Multiservice Procedures for the Tactical Employment of Nonlethal Weapons*; and a brief reference to nonlethal force in the *Joint Task Force Commander's Handbook for Peace Operations*.

*A Joint Concept for Non-Lethal Weapons*, a core document for the JNLWP, focuses on the tactical, rather than the operational, employment of NLWs. NLWs are seen as a means of providing commanders a “rheostatic” capability across the force continuum. If this continuum is understood to extend from the threat of force at one end to the application of deadly force at the other end, then the rheostatic capability provided by NLWs gives the tactical commander greater flexibility to increase or decrease the degree of force that is employed in a particular situation.<sup>84</sup>

At this time, the best single source of information and guidance on the employment of NLWs is *Multiservice Procedures for the Tactical Employment of Nonlethal Weapons*, published by ALSA. While the U.S. Army, Marine Corps, Navy,

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<sup>83</sup>Chairman of the Joint Chiefs of Staff, Joint Publication 3-09, *Doctrine for Joint Fire Support*, (Washington, DC: U. S. Government Printing Office, 12 May 1998), I-1.

<sup>84</sup>Joint Non-Lethal Weapons Directorate, *A Joint Concept for Non-Lethal Weapons*, 7.

and Coast Guard have approved this document, it is not joint doctrine. As stated in Joint Pub 1-01, "only publications approved by the Chairman of the Joint Chiefs of Staff will be referred to as 'joint publications.' Publications involving two or more Services that have not been reviewed and approved by the Chairman of the Joint Chiefs of Staff will be referred to as 'multi-Service' and will identify the participating Services (e.g., Army and Air Force doctrine or Army, Navy and Air Force procedures)."<sup>85</sup> Although it is not joint doctrine, this publication does provide "a single-source, consolidated reference on the tactical employment of NLWs and supporting systems on the non-linear battlefield of today. Additionally, it will fill the void that currently exists about MTTP for the tactical employment of NLWs."<sup>86</sup>

The relative scarcity of publications relating to the joint employment of nonlethal technology can be attributed, in part, to the restriction imposed by Joint Pub 1-01 that joint doctrine "will be written to reflect extant capabilities."<sup>87</sup> The extant capabilities of NLWs are admittedly limited at this time; it is the potential capabilities of these weapons that form the basis of this study. This distinction between extant and potential capabilities as it relates to joint doctrine will be explored further at the end of this chapter and in chapter 5.

Statutory requirements and institutional interest are two other possible explanations for not only for the dearth of nonlethal doctrinal material, but also for the bias toward the U.S. Army and Marine Corps in the information that is available. Under

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<sup>85</sup>Chairman of the Joint Chiefs of Staff, *Joint Pub 1-01*, I-1.

<sup>86</sup>ALSA, *Multiservice Procedures for the Tactical Employment of Non-Lethal Weapons*, i.

<sup>87</sup>Chairman of the Joint Chiefs of Staff, *Joint Pub 1-01*, I-2.

DODD 3000.3, the Under Secretary of Defense for Acquisition and Technology (USD (A&T)) is assigned "principal oversight responsibility for the DOD Non-Lethal Weapons Program, including joint Service program coordination to help highlight and prevent duplication of development in both classified and unclassified program."<sup>88</sup> The objectives of the JNLWP are "to develop, and recommend to the USD (A&T) a fully integrated and coordinated NLW program, to provide the most current and accurate information available, and to provide the best NLW technologies and equipment to support our operating forces."<sup>89</sup>

DODD 3000.3 designates the Commandant of the Marine Corps as the DOD EA for the program and assigns him responsibility for "program recommendations and for stimulating and coordinating non-lethal weapons requirements."<sup>90</sup> The EA is assisted by the Marine Corps Deputy Chief of Staff for Plans, Policies and Operations who is the Chairman of the NLW Integrated Product Team (IPT). In order to assist the EA in fulfilling his responsibilities, the IPT "advises the EA on all joint NLW activities. . . . recommends approval of the consolidated DoD Research, Development, Testing, and Evaluation Program Objective Memorandum (RDT&E POM). . . . provides oversight to review and resolve security, environmental, health and safety, and policy issues that may arise in the development of NLW programs and it is the final arbiter for service concerns."<sup>91</sup> The Army Deputy Chief of Staff for Operations and Plans is the vice chair

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<sup>88</sup>Department of Defense, DODD 3000.3, *Policy for Non-Lethal Weapons*, 2.

<sup>89</sup>Department of Defense, *Joint Non-Lethal Weapons Program 1998--A Year of Progress*, 3.

<sup>90</sup>Department of Defense, DODD 3000.3, *Policy for Non-Lethal Weapons*, 2.

<sup>91</sup>Department of Defense, *Joint Non-Lethal Weapons Program 1998--A Year of Progress*, 4.

of the IPT, with additional members representing each of the military services, OSD, the Joint Staff, and the CINCs. In addition, the Departments of Energy, Transportation and Justice are invited to send observers to the IPT.<sup>92</sup>

Further Marine Corps influence in the program is provided through the Joint Coordination and Integration Group (JCIG) and the JNLWD. The JCIG, which is chaired by the Director, JNLWD, a U.S. Marine Corps Colonel, "coordinates and integrates JNLWP concepts and requirements into a management systems to achieve standardization and interoperability and to optimize resources."<sup>93</sup> The JCIG "maintains and updates the DoD Joint Concept for NLW; reviews NLW Mission Need Statements and Operational Requirements Documents for joint applicability and recommends joint programs; develops and prioritizes the DoD Requirements List in support of POM development; reviews service NLW programs; recommends approval of new starts or termination of unsuccessful or unrewarding efforts; and coordinates and assists in determining a lead service."<sup>94</sup> The JNLWD is the "EA's action office for day-to-day activities of the JNLWP and supporting the IPT."<sup>95</sup>

The research conducted for this study reveals that institutional interest in the employment of nonlethal technology varies greatly among the military services. As might be expected given their statutory roles and missions, the U.S. Army and the Marine Corps have dedicated a significant amount of resources to exploring this technology. For

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<sup>92</sup>Department of Defense, *Joint Non-Lethal Weapons Program 1997--A Year in Review*, 3.

<sup>93</sup>Department of Defense, *Joint Non-Lethal Weapons Program 1998--A Year of Progress*, 4

<sup>94</sup>*Ibid.*

<sup>95</sup>*Ibid.*

example, as previously noted, the Marine Corps already fields NLW capability sets for its deploying MEUs (SOC) and the Army plans to begin purchase of thirty NLW capability sets in FY00. A review of the appendix to this study will reveal that the Army's interest in NLWs is also reflected in several Training and Doctrine Command (TRADOC) publications that address the subject of nonlethal technology.

From a review of published material, the U.S. Air Force appears to consider the principal applications of nonlethal technology to be in the law enforcement, physical security, and force protection areas. The Air Force Security Forces Center (AFSFC) at Lackland Air Force Base in San Antonio, Texas has the "lead role in the identification, user evaluation, and procurement of NLWs for force protection applications."<sup>96</sup> The Air Force is also working closely with the OSD PSEAG to develop the Saber 203 Laser Illuminator. The Air Force Studies and Analysis Division, Brooks Air Force Base, San Antonio, Texas, is planning to use the Joint Conflict and Tactical Simulation (JCATS) system in 1999 to begin several studies related to the operational employment of nonlethal technology. A two-year study for the Air Force Special Operations Command (AFSOC) will examine multiple scenarios to determine the utility of different types of NLWs in AFSOC mission areas. A second study will use JCATS in support of the Air Force Force Protection Battle Lab's Active Denial Technology Initiative. Modeling and simulation will focus on flight line defense, MOUT, and NEO scenarios, followed by a live force-on-force exercise.<sup>97</sup>

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<sup>96</sup>Department of Defense, "USAF Reorganizes their NLW Program," *Joint Non-Lethal Weapons Directorate News* 1, no. 7 (August 1998): 3

<sup>97</sup>Department of Defense, "Joint Conflict and Tactical Simulation (JCATS) Modeling and Simulation Update," *Joint Non-Lethal Weapons Program News* 2, no. 2 (February 1999): 7.

The U.S. Navy has devoted the least amount of published material to nonlethal technology, although a recent article in the *Naval War College Review* may indicate a change in that trend.<sup>98</sup> The Navy has, however, formed an Operations Other Than War Technology Center at the NSWC to coordinate and assess Navy requirements and potential technology solutions for MOOTW missions. The NSWC is active in the development of several nonlethal programs such as the UAV-NL and the VSS.

Analysis of Evaluation Criteria for the Development of  
Joint Doctrine for NLWs

The final step in the analysis process is to evaluate the data presented in this chapter against the evaluation criteria identified in chapter 3. This analysis will take the form of providing answers to the three secondary research questions posed in chapter 3.

Does Nonlethal Technology Provide a Significantly New Military Operational Capability  
to Achieve U.S. Strategic Objectives?

The results of this study support the findings of a previous study that concluded that nonlethality has “specialized applications” and will not completely replace lethality in warfare in the foreseeable future.<sup>99</sup> While NLWs are not a panacea, in a large number of MOOTW and SSC scenarios they do provide an equal, and in many cases superior, capability when compared with lethal force. In fact, there are some situations where U.S. military forces do not currently have an operational capability that nonlethal technology will soon be able to provide. One such capability is the ability to conduct a nonlethal preemptive strike. Although the applications for use of NLWs in a MTW are more

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<sup>98</sup>Coppernoll, 112-131.

<sup>99</sup>Lovelace and Metz, v-vii.

limited, there are still enough potential military applications of NLWs at all levels of the spectrum of warfare to justify the continued exploration of concepts for operational employment of the technology.

#### Is There A Critical Void in Extant Joint, Service and Multiservice Doctrine relating to the Employment of Nonlethal Technology?

This study identified that there is a significant deficiency in published material relating to the operational employment of NLWs. The ALSA *Multiservice Procedures for the Tactical Employment of Nonlethal Weapons* and the *Joint Concept for Nonlethal Weapons*, while useful, only partially fill this gap. They are, at best, only a short-term solution because they do not fulfill the purpose and functions of joint doctrine. If nonlethal technology is to be employed in joint operations, then joint doctrine that addresses the operational concepts for using the technology must be developed and published.

#### Will Joint Doctrine for NLWs Enhance the Combat Effectiveness of U.S. Forces?

In order to evaluate this criterion, it is necessary to first define and determine a means to measure combat effectiveness. Although the term "combat effectiveness" is used frequently throughout joint and service doctrine, there is no definition of the term listed in Joint Pub 1-02, *Department of Defense Dictionary of Military and Associated Terms*. Field Manual (FM) 101-5-1/Marine Corps Reference Publication (MCRP) 5-2A, *Operational Terms and Graphics*, defines combat effectiveness as "the ability of a unit to



perform its mission. Factors such as ammunition, personnel, status of fuel, and weapons systems are assessed and rated.”<sup>100</sup>

While this definition may be useful at the tactical level, it is too narrow in scope to serve as a valid standard against which to measure the utility of joint doctrine for NLWs. Therefore, for the purposes of this study the fundamentals of joint warfare as outlined in Joint Pub 1 will be used as a proxy for combat effectiveness.<sup>101</sup> If these fundamentals are accepted as a measure of combat effectiveness then, based on the research conducted for this study, joint doctrine for NLWs will enhance the combat effectiveness of U.S. forces in the following ways:

Unity of effort. One service publication notes that doctrine “establishes a particular way of thinking about war and a way of fighting. . . . doctrine provides the basis for harmonious actions and mutual understanding.”<sup>102</sup> A common operational framework linking national objectives, operational requirements, and nonlethal capabilities does not exist today. Without a clear understanding of how NLWs contribute to the attainment of strategic goals, the ability of the armed forces to apply nonlethal technology in joint operations will be unfocused, uncoordinated and, ultimately, ineffective. Joint doctrine for NLWs can establish that critical linkage.

Concentration of military power. In describing concentration, Joint Pub 1 states that “properly trained and motivated forces with superior technology, executing

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<sup>100</sup>U.S. Department of the Army and U.S. Marine Corps, Field Manual 101-5-1/Marine Corps Reference Publication 5-2A, *Operational Terms and Graphics* (Washington, DC: U. S. Government Printing Office, 30 September 1997), 1-30.

<sup>101</sup>Chairman of the Joint Chiefs of Staff, *Joint Pub 1*, III-1-9.

<sup>102</sup>U.S. Marine Corps, Marine Corps Doctrinal Publication 1, *Warfighting*, (Washington, DC: Headquarters, U.S. Marine Corps, 20 June 1997), 56.

innovative, flexible, and well-coordinated plans, provide a decisive qualitative edge.”<sup>103</sup>

While combat power is usually associated with lethal methods, as the scenarios described in this chapter demonstrate, skillful planning and employment of NLWs at the decisive time and place can be equally effective. However, coordinated joint planning and employment require joint doctrine.

Seizing and maintaining the initiative. The U.S. has a significant advantage over potential adversaries in the development of nonlethal technology. As demonstrated in this study, this technology can fill gaps between requirements and capabilities, but the technology alone is not sufficient. With a common doctrinal foundation for the employment of NLWs, joint forces would be able to fully exploit the capabilities provided by nonlethal technology through the use of mission orders and tactics.

Agility. Strategic and operational agility are the results of “thinking, planning, communicating, and acting faster than the enemy can effectively react.”<sup>104</sup> The fundamental principles and common language provided by joint doctrine for NLWs could contribute to agility by reducing the time required to plan, communicate, and execute the employment of nonlethal technology in support of national objectives.

Operations Extended to Fullest Breadth and Depth. As noted throughout this study, NLWs provide commanders with operational capabilities that extend across the force continuum. However, for those capabilities to be effective, joint doctrine must address how to synergistically integrate lethal and nonlethal capabilities.

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<sup>103</sup>Chairman of the Joint Chiefs of Staff, *Joint Pub 1*, III-2.

<sup>104</sup>*Ibid.*

Maintaining Freedom of Action. If the armed forces of the U.S. are to maintain the freedom to act with NLWs across the spectrum of crises, the diplomatic and informational components of national security strategy must be fully integrated with the military capabilities of nonlethal technology. Joint doctrine for NLWs will facilitate freedom of action by addressing how to effectively manage U.S. domestic and international perceptions (to include those of potential adversaries) of the capabilities and limitations of NLWs. The critical role of the media in securing domestic and international support was succinctly described in a recent study on NLWs:

The "CNN factor," or media reaction to the employment of NLWs, will be an important influence upon public perceptions. In turn media coverage will be shaped primarily by the circumstances and the appropriateness of specific instances of nonlethal force and by the integrity of NLW-capability claims. Media coverage might elicit such negative public or political reactions as, on one hand, that NLWs violate international treaties, damage the environment, make war more likely by reducing the destructive consequences, maim and injure noncombatants, cost too much, or simply do not work; or on the other hand that NLWs reflect a sentimental or naïve view of war and a lack of resolve to defend national interests, that such weapons risk the lives of soldiers, compromise operational effectiveness, are insufficiently potent to punish aggressors, and are "politically correct" but militarily irrelevant.<sup>105</sup>

In addition, joint doctrine must also define the operational security requirements to preclude potential adversaries from gaining information on nonlethal capabilities that could then be used to defeat the technology.

Sustaining Operations. One of the key deficiencies identified by this study was the lack of available information on strategic and theater logistics requirements for the employment of nonlethal technology. In particular, equipment interoperability among the

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<sup>105</sup>Coppernoll, 124-125.

services; availability of host nation and maritime prepositioning support; and maintenance requirements must be addressed by joint doctrine before NLWs can be employed on a large scale.

Clarity of Expression. As noted in chapter 1 of this study, at this time there is a lack of consensus on even the most basic aspects of nonlethal technology, such as terminology and definitions. As one military leader has noted, "doctrine provides a military organization with a common philosophy, a common language, a common purpose, and a unity of effort."<sup>106</sup> Joint doctrine would improve combat effectiveness by providing commanders with clear, authoritative guidance on how to employ nonlethal technology.

Knowledge of Self. Joint Pub 1 describes knowledge of self as "a full and frank appreciation for the capabilities and limitations of all friendly forces."<sup>107</sup> As this study has demonstrated, NLWs have significant advantages as well as certain disadvantages. However, if these strengths and weaknesses are not promulgated throughout the armed forces of the U.S. and understood by all soldiers, sailors, airmen, and Marines, then operational employment of NLWs will be degraded. Joint doctrine can delineate capabilities and limitations to joint forces, thus contributing to the self-knowledge necessary for successful application of nonlethal technology.

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<sup>106</sup>General George H. Decker, USA, in a speech given at the U.S. Army Command and General Staff College, Fort Leavenworth, KS, 16 December 1960, quoted in Robert D. Heintz, Jr., *Dictionary of Military and Naval Quotations* (Annapolis, MD: Naval Institute Press, 1966), 95 and reprinted in *Joint Pub 1*, I-3.

<sup>107</sup>Chairman of the Joint Chiefs of Staff, *Joint Pub 1*, III-7.

Knowledge of the Enemy. This is an area where joint doctrine for NLWs will be of particular value in improving combat effectiveness. This study has followed the approach of the *National Military Strategy* in focusing on capabilities-based, as opposed to threat-based, applications of nonlethal technology. The *NMS* recognizes that threats to U.S. national security may come from regional states and groups of states; asymmetric challenges such as WMD and terrorism; transnational dangers such as organized crime, ethnic disputes and religious rivalries, environmental degradation, and drug trafficking; and "wild cards." threats.<sup>108</sup> Because there is no clearly defined threat, joint doctrine for NLWs can fulfill a vital role by outlining the nonlethal employment considerations that must be addressed regardless of the threat. In addition, intelligence support requirements provided by joint doctrine will be critical to effective employment of NLWs.

This chapter presented the outcomes of the research conducted for this study and evaluated the data against the three criteria for joint doctrine development described in chapter 3. The next chapter will provide some conclusions and recommendations based on the results of this study.

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<sup>108</sup>Chairman of the Joint Chiefs of Staff, *National Military Strategy*, 8-10.

## CHAPTER 5

### CONCLUSIONS AND RECOMMENDATIONS

War is both timeless and ever changing. While the basic nature of war is constant, the means and methods we use evolve continuously.<sup>1</sup>

Marine Corps Doctrinal Publication 1, *Warfighting*

From the foregoing analysis, the principal conclusion to be drawn from this study is that the armed forces of the U.S. do need joint doctrine for NLWs. Nonlethal technology provides the armed forces with significantly enhanced military operational capabilities in support of national strategic objectives. Although these capabilities are either available now or will be available within the next decade, there is a considerable void in current doctrinal publications that address the employment of NLWs. Joint doctrine for NLWs, by filling that warfighting void, will increase the combat effectiveness of U.S. military forces. Based on the scheduled production dates for the NLWs programs as provided in this study, by the year 2003 the armed forces will have a significantly enhanced nonlethal operational capability. In order to take maximum advantage of this improved capability, it is critical that joint doctrine for the employment of nonlethal technology be developed and approved before that time. However, certain institutional impediments must be overcome in the interim to implement the conclusions of this study.

The first impediment to the near-term implementation of joint doctrine for NLWs is the existing joint doctrine development program. While the most recent *National*

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<sup>1</sup>U.S. Marine Corps, MCDP 1, *Warfighting*, 17.

*Military Strategy of the United States of America* states that a "fully joint force requires joint operational concepts, doctrine, tactics, techniques and procedures,"<sup>2</sup> the myopic view of joint doctrine typified by Joint Pub 1-01 seriously hinders the ability of the armed forces to achieve this goal. It is true that joint doctrine cannot be developed for vague or fictitious capabilities; however, requirement that joint doctrine be developed only for extant capabilities is a needless restraint on the preparation of joint forces for future military operations.

The language of Joint Pub 1-01 is consistent with a commonly accepted view that doctrine should be developed or revised only after a new technology has sufficiently matured. An alternative view recognizes that an innovative doctrine can provide the impetus for the development of new warfighting technology.<sup>3</sup> In the case of NLWs, it can be argued that the "lower tier" weapons currently fielded by DOD (for example, flash-bang and sting-ball grenades, batons, caltrops, sticky and aqueous foam, rubber and wooden bullets, sponge projectiles, and riot control agents) do not provide a significantly improved joint operational capability.<sup>4</sup> This narrow view of nonlethal capabilities is reflected in the comments of one author who wrote, "Non-lethal weapons do not provide a new element of national power, as some have suggested. They are merely an extension of military force to fill the gap between warnings and deadly force."<sup>5</sup> If this argument is

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<sup>2</sup>Chairman of the Joint Chiefs of Staff, *National Military Strategy*, 22.

<sup>3</sup>See Douglas C. Lovelace Jr. and Thomas-Durell Young, *Strategic Plans, Joint Doctrine and Antipodean Insights* (Carlisle, PA: U.S. Army War College, Strategic Studies Institute, 20 October 1995), 11; and Morehouse, *Nonlethal Weapons*, 31.

<sup>4</sup>Bunker, *Five Dimensional (Cyber) Warfighting*, 11.

<sup>5</sup>Colonel Frederick M. Lorenz, "Non-Lethal Force: The Slippery Slope of War?" *Parameters* 26, no. 3 (Autumn 1996): 61.

accepted, then, based upon the criteria established for this study, joint doctrine for NLWs would not be required.

However, a focus solely on extant capabilities ignores the significant potential capabilities of the more advanced NLWs that have been described in this study. These capabilities are neither vague nor fictitious. NLWs are currently being developed to provide specific, requirements-based operational capabilities within the constraints imposed by current scientific knowledge.

Admittedly, the possibility does exist that some of the weapons examined in this study will not be able to provide certain required capabilities. However, this possibility does not in any way negate the conclusions of this study. One of the basic assumptions of this study was that certain nonlethal operational capabilities either are, or will be, available to the armed forces of the U.S. by the year 2010. This assumption was not contingent on any particular weapon or system, but on NLWs as a category of weapons. Once a desired capability has been identified, weapons or combinations of weapons (which may in fact be different from the ones identified in this study) can then be developed to provide that capability. The conclusions of this study are therefore based upon both extant and potential, but realistic, technically attainable, capabilities.

The second barrier to the development of joint doctrine for NLWs is a tenacious resistance to change from within the military. This resistance to change is not a new phenomenon in the history of warfare. The introduction of new technology is often greeted with a certain amount of skepticism from the "old guard" of the military establishment. In the 1920s and 1930s, the antagonism between the those Navy officers of the "battleship mentality" and those Navy and Marine Corps officers who viewed



carrier aviation and the amphibious assault as decisive elements in the coming war with Japan is illustrative of the difficulties that proponents of nonlethal technology will undoubtedly face: "The case of the admirals during the 'twenties and early 'thirties could be matched in other military organizations at other periods in history simply because they were caught up in the central paradox of military thought, one that faces every generation of military leaders; namely, that in few spheres of human activity are change and progress so constant and the need for accommodation and adjustment so unremitting as in the military; yet in few spheres, seemingly, are the ruling minds so rigidly resistant to change."<sup>6</sup> A similar resistance to the development of nonlethal technology can be found among serving officers today: "The last thing the military needs at this point is a family of weapons that has only limited tactical use in operations other than war and offers no clear advantage over other non-lethal methods."<sup>7</sup>

Whether this resistance is justified is not germane to this study. As stated in chapter 1, it was not the intent of this study to assess the many arguments for and against the integration of nonlethality into U.S. national security strategy. Several other authors have examined that debate.<sup>8</sup> The first assumption of this study was that the U.S. NCA have already made the decision to develop and employ nonlethal technology. However, the resistance (or reluctance) of some members of the armed forces, particularly those in

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<sup>6</sup>John P. Campbell, "Marines, Aviators, and the Battleship Mentality, 1923-1933," *Journal of the Royal United Service Institution* 109 (February 1964): 49-50.

<sup>7</sup>Stanton, 68.

<sup>8</sup>See Lovelace and Metz, *Nonlethality and American Land Power*; Pope, "Nonlethality and Peace Operations;" Morehouse, *Nonlethal Weapons*; and Coppernoll, "The Nonlethal Weapons Debate."

senior leadership positions, to accept that decision will impact on the future direction of nonlethal doctrinal development.

Having concluded that joint doctrine for NLWs is needed, the next logical question is, What should be included in that doctrine? There is no standardized format for the contents of a joint publication. The contents of each publication vary depending on the subject. Based on the results of the research conducted for this study, certain minimum considerations must be addressed. With some modifications, ALSA's *Multiservice Procedures for the Tactical Employment of Nonlethal Weapons* can be used as the foundation for joint doctrine for NLWs. Additional recommended topics are outlined below. A more detailed development of these basic topics will be required in order to produce an effective joint doctrine for NLWs; this outline is presented only as a starting point for further analysis.

## Joint Doctrine for Nonlethal Weapons

### Chapter I: Principles and Concepts

Historical background on the development and employment of NLWs. A brief summary of the key milestones in the development of the JNLWP is required in order to highlight the role of NLWs in responding to emerging challenges to U.S. national interests.

Key operational definitions relating to nonlethal technology. As noted in chapter 1 of this study, one of the most significant limitations on the operational employment of NLWs is a lack of consensus on basic terminology and definitions. By standardizing terms and definitions, joint doctrine for NLWs will overcome this obstacle.

Capabilities, advantages, and limitations of NLWs as compared with lethal weapons. As with introduction of any new technology, operational commanders must thoroughly understand the capabilities, advantages, and limitations of NLWs in order to effectively employ the technology. Joint doctrine, as contrasted with JTTP, should not provide the specific technical characteristics of particular weapons systems, but should describe the broad operational capabilities that NLWs provide.

Purpose of employing nonlethal technology in military operations. If NLWs are to provide commanders with an enhanced operational capability, then joint doctrine must clearly delineate the linkage between national objectives and the employment of NLWs in military operations.

## Chapter II: Responsibilities for the Operational Employment of Nonlethal Weapons

Responsibilities of the National Command Authorities. Although joint doctrine is not policy, joint doctrine for NLWs must address the responsibilities of the NCA to articulate national policies for the development and employment of nonlethal technology.

Responsibilities of the CJCS. Joint doctrine must describe the role of the CJCS in providing strategic direction for the employment of NLWs through the Joint Strategic Planning System, and the Planning, Programming, and Budgeting System.

Responsibilities of the Combatant Commanders, subunified, joint task force and component commanders. Through the Joint Operational Planning and Execution System, operational commanders must integrate nonlethal technology into plans and orders that support national security objectives.

Responsibilities of the service chiefs. Joint doctrine for NLWs must address the statutory role of the military services to train and equip those forces assigned, allocated, or apportioned to the CINCs for the operational employment of nonlethal technology.

### Chapter III: Planning Considerations

Mission requirements. Commanders should not make either/or decisions in the case of NLWs. A combination of lethal and NLWs may be required to meet particular contingencies. While NLWs have certain advantages, used imprudently they may result in an increased risk to the force and compromise mission accomplishment.

Rules of Engagement. The Joint Chiefs of Staff Standing Rules of Engagement (SROE) do not need to be changed to accommodate the use of NLWs. The rules of necessity and proportionality, as well as the right to self-defense, apply equally to the use of nonlethal as well as deadly force.<sup>9</sup>

Intelligence support requirements. A thorough understanding of cultural, religious, economic and political factors is critical in determining the most appropriate use of NLWs in a particular situation.

Logistics support requirements. Any increase in the logistical footprint needed to support the operational employment of NLWs will detract from their utility. As with lethal weapons, logistics planning factors, storage requirements and resupply procedures must be developed to support the commander's planned employment of NLWs. Handling of incapacitated personnel (detainees, noncombatants) must be anticipated.

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<sup>9</sup>Coppermoll, 125.

Training Requirements. In addition to techniques and procedural training, personnel armed with NLWs must be given realistic, practical application training with the use of NLWs in conjunction with the SROE.<sup>10</sup> Without proper training, NLWs can often become lethal, thus negating any advantages that nonlethal technology provides to military forces. Units and individuals should therefore be certified in the use of specific NLWs.

Personnel and organizational structure requirements. Joint doctrine must address any changes in military occupational specialties or organizational structure (for example, designated nonlethal response units) required to accommodate the introduction of NLWs into tactical units.

Command, control and communications requirements. C<sup>3</sup> requirements for the employment of NLWs are the same as those for lethal weapons. Centralized planning and decentralized execution should guide the employment of NLWs at the tactical level. Therefore, junior leaders must understand their mission and the commander's intent as well as the capabilities and limitations of NLWs.

Medical requirements. Detailed information on the physiological and psychological effects of various types of NLWs on personnel must be promulgated in order to determine medical logistic support requirements, establish treatment protocols, and develop antidotes for inadvertent use of NLWs on friendlies. Additional training for medical personnel may be required depending on the types of NLWs employed in a particular operation.

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<sup>10</sup>Ibid.

Civil affairs/psychological operations requirements. The “psychological precision”<sup>11</sup> offered by NLWs should be reinforced by CA/PSYOPS operations. In conjunction with public affairs personnel, any perception that employment of NLWs by U.S. forces implies vulnerability must be overcome or the level of violence could escalate rapidly. Civilian legal claims should be handled expeditiously.

Public affairs. An effective media plan is essential when employing NLWs. However, public affairs officials, in the interests of operational security, must be careful about providing descriptions of the capabilities of NLWs. With this knowledge, a potential adversary could learn how to defeat the technology. Also, doctrine must address how to effectively manage U.S. and international public perceptions and expectations of the operational capabilities of NLWs. One potentially damaging public perception that must be overcome is that NLWs are used to the exclusion of lethal weapons.<sup>12</sup> Public affairs personnel must receive extensive training on the capabilities and limitations of NLWs.

Force protection requirements. Joint doctrine for NLWs must emphasize that the commander’s overriding responsibility for the safety of his unit must never be compromised by use of nonlethal technology.

### Summary

Beginning with the assumption that, as a matter of national policy, the U.S. is committed to the use of NLWs under certain conditions, this study focused on the

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<sup>11</sup>Lovelace and Metz, 1.

<sup>12</sup>Ibid.

practical issues involved in developing a common operational framework for the employment of nonlethal technology. In particular, the study was concerned with answering the question, Do the armed forces of the U.S. need joint doctrine for NLWs? In order to achieve this goal, the study examined the purpose and functions of joint doctrine; the capabilities provided by nonlethal technology in support of national military objectives; and the current status of published information relating to the operational employment of nonlethal weapons. These areas were analyzed to determine their role in enhancing the combat effectiveness of U.S. military forces.

While nonlethal technology is necessary to achieve the improved operational capabilities noted in this study, the conclusion of this study is that this technology alone is not sufficient to achieve improved combat effectiveness. In the history of warfare, new technology without the accompanying doctrine has seldom been decisive. Sound doctrine, which addresses the fundamental issue of how to best employ a new technology in order to increase combat effectiveness, has often been the difference between victory and defeat. The critical role of doctrine is highlighted by one author who notes, "the accumulation of materiel, however conscientious, can never be the answer to the tactical and strategic demands of national defence. Equipment and techniques can frequently be improvised in time of war but seldom the underlying doctrines governing their application without prohibitively costly practical lessons: for valid doctrines of war, the offspring of years of careful planning and unambiguous motivation on the part of an expert professional staff, are long in gestation."<sup>13</sup>

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<sup>13</sup>Campbell, 50.

This nation's future readiness is endangered if the armed forces of the U.S. continue to wait for nonlethal technology to fully mature before addressing how to best employ it. The national security of the U.S. demands that joint doctrine for NLWs be developed now.



## APPENDIX

### POTENTIAL SOURCES OF JOINT DOCTRINE FOR NONLETHAL WEAPONS

#### Joint

Joint Publication 1-02, *DOD Dictionary of Military and Associated Terms*

Joint Publication 2-01, *Joint Intelligence Support to Military Operations*

Joint Publication 3-0, *Doctrine for Joint Operations*

Joint Publication 3-03, *Doctrine for Joint Interdiction Operations*

Joint Publication 3-07, *Joint Doctrine for Military Operations Other Than War*

Joint Publication 3-07.2, *JTTP for Antiterrorism*

Joint Publication 3-07.3, *JTTP for Peace Operations*

Joint Publication 3-09, *Doctrine for Joint Fire Support*

Joint Publication 3-12.1, *Doctrine for Joint Theater Nuclear Operations*

Joint Publication 3-55, *Doctrine for RSTA Support for Joint Operations*

Joint Publication 3-56.1, *Command and Control for Joint Air Operations*

Joint Publication 3-57, *Doctrine for Joint Civil Affairs*

Joint Publication 3-58, *Joint Doctrine for Military Deception*

CJCSI 3141.01, *Responsibilities for the Management and Review of Operations Plans*

CJCSM 3122.03, *Joint Operations Planning and Execution System Volume II: Planning Formats and Guidance*

Joint Nonlethal Weapons Directorate, *A Joint Concept for Non-Lethal Weapons*

#### Multiservice

Air Land Sea Application Center (ALSA), *Multiservice Procedures for the Tactical Employment of Non-Lethal Weapons*

FM 100-23-1/FMFRP 7-16/NDC TACNOTE 3-07.6/ACCP 50-56/PACAFP 50-56/USAFEP 50-56, *Multiservice Procedures for Humanitarian Assistance Operations*

Joint Warfighting Center, *Joint Task Force Commander's Handbook for Peace Operations*

Army

FM 19-4, *Military Police Battlefield Operations*

FM 19-15, *Civil Disturbances*

FM 27-10, *The Law of Land Warfare*

FM 100-5, *Operations*

FM 100-23, *Peace Operations*

AR 190-14 (*Carrying Firearms and Use of Force for Law Enforcement and Security Duties*)

AR 350-7 (*Training and Evaluation of Forces for Civil Disturbance*)

TRADOC Pamphlet 525-5 Force XXI Operations, *A Concept for the Evolution of Full Dimensional Operations for the Strategic Army of the Twenty-First Century*

TRADOC Pamphlet 525-73, *Concept for Nonlethal Capabilities in Army Operations*

Marine Corps

MCDP 1, *Warfighting*

MCDP 1-3, *Tactics*

MCDP 6, *Command and Control*

*United States Marine Corps Concepts and Issues '99: Winning in the 21<sup>st</sup> Century*

Navy

SECNAVINST 5711.8A, *Review of Weapons Under International Law*

Air Force

AFDD 2-3, *Military Operations Other Than War*

AFP 11031, *International Law; The Conduct of Armed Conflict and Air Operations*.

Other

DODD 5500.15, *Review of Legality of Weapons Under International Law*

DODD 3000.3, *Policy for Nonlethal Weapons*,

## GLOSSARY

Acoustics. A class of weapons that emit a high power, very low frequency (infrasound) or very high frequency (ultrasound) beam. These weapons employ sound waves in a concentrated form against various targets. Their use can result in the shattering of metal or composite materials on machines or building materials.

Antitraction substances. Substances that can be aerosol applied, poured, or painted on any surface, rendering it slippery or boggy. Some of these substances will lubricate the surface, preventing traction of people and machines; others will soak into the surface on which they are applied, making a chemical mud that prevents movement of personnel or equipment.

Area Denial. To deny or render an area unexploitable to other groups or forces.

Caltrops. A personnel and vehicular barrier device with four projecting spikes so arranged that when three of the spikes are on the ground, the fourth points upward.

Collateral damage. Unintended and undesirable civilian personnel injuries or material damage adjacent to a target produced by the effects of friendly weapons.

Combustion Modifiers. Various gases, foams, or liquids that are designed to choke internal combustion engines. Also included in this category are additives that will corrode the internal components of any engine that aspirates the substance.

Concept Exploration. Phase 0 of the acquisition process. Short-term concept studies are used to define and evaluate the feasibility of alternative concepts.

Crowd Control. Influencing the behavior and activities of a potentially hostile crowd as well as the capability to bring a mob engaged in a riot under control.

Directed energy weapons. Any coherent or concentrated energy source (e.g., lasers) used to cause burning, cracking, distortion, or impairment of conventional or unconventional machines. When used against personnel, these weapons can cause stammer, confusion, or coma.

Disable. To make motionless or powerless by damage or injury.

Doctrine. Fundamental principles by which the military forces or elements thereof guide their actions in support of national objectives. It is authoritative but requires judgment in application.

Electromagnetic weapons. Weapons that use high-powered microwaves to disrupt brainwaves, communications, or any electronic component of a machine. Their use results in confusion, stupor, or coma in people or animals and the disruption, scrambling, or jamming of electronics.

Engineering and Manufacturing Development (EMD). Phase II of the acquisition process, where final design and testing are performed between milestone II and milestone III.

Entanglers. NLWs that use polymers, fibers, or wire to entrap personnel or vehicles in a net, foul propellers, and/or stop fan blades.

Force Protection. Security program designed to protect Service members, civilian employees, family members, facilities, and equipment, in all locations and situations, accomplished through planned and integrated application of combatting terrorism, physical security, operations security, personal protective services, and supported by intelligence, counterintelligence, and other security programs.

Incapacitate. To produce temporary physiological or mental effects, or both, on individuals that will render individuals incapable of concerted effort in the performance of their assigned duties.

Joint doctrine. Fundamental principles that guide the employment of two or more Services in coordinated action toward a common objective. It will be promulgated by the Chairman of the Joint Chiefs of Staff, in coordination with the combatant commands, Services, and Joint Staff.

Joint TTP. The actions and methods which implement joint doctrine and describe how forces will be employed in joint operations. They will be promulgated by the Chairman of the Joint Chiefs of Staff, in coordination with the combatant commands, Services, and Joint Staff.

Multiservice doctrine. Fundamental principles that guide the employment of forces of two or more Services in coordinated action toward a common objective. It is ratified by two or more Services, and is promulgated in multi-Service publications that identify the participating Services.

Nonlethal ballistics. A class of nonlethal weapons which deliver a blunt impact (non-penetrating) projectile (for example, rubber bullets).

Nonlethal weapons. Weapons that are explicitly designed and primarily employed so as to incapacitate personnel or materiel, while minimizing fatalities, permanent injury to personnel, and undesired damage to property and the environment. Unlike conventional lethal weapons that destroy their targets principally through

blast, penetration, and fragmentation, nonlethal weapons employ means other than gross physical destruction to prevent the target from functioning. Nonlethal weapons are intended to have one, or both, of the following characteristics: (a) they have relatively reversible effects on personnel or materiel, and (b) they affect objects differently within their area of influence. This definition does not include information warfare, electronic warfare, or any other military capability not designed specifically for the purpose of minimizing fatalities, permanent injury to personnel, and undesired damage to property and the environment, even though these capabilities may have nonlethal effects. This definition does not require or expect nonlethal weapons to have zero probability of producing fatalities or permanent injuries. Nonlethal weapons are intended to significantly reduce the probability of such fatalities or injuries as compared with traditional military weapons, which achieve their effects through the physical destruction of targets.

Optical munitions. A class of weapons that rely upon either a multi-directional or uni-directional intense burst of light (laser) generated by the high explosive shock of heating an inert gas. Also used to refer to a class of NLWs that emit an extremely bright light causing temporary blindness.

Program Definition/Risk Reduction. Phase I of the acquisition process, where one or more concepts are explored to assess advantages and disadvantages, estimate costs, and reduce risks before proceeding to Phase II, Engineering and Manufacturing Development.

Rheostatic Capability. Nonlethal weapons that are capable of delivering varying levels of "tunable" effects. This allows commanders to increase or decrease the degree of influence used to effect compliance.

Rules of Engagement (ROE). Directives issued by competent military authority which delineate the circumstances and limitations under which United States forces will initiate and/or continue combat engagement with other forces encountered.

Superpolymers. Various substances applied by aerosol, liquid, or powder form that will form an impenetrable surface over the target. The effect is similar to applying a permanent, quick-drying glue over an entire target, rendering all its moving components ineffective.

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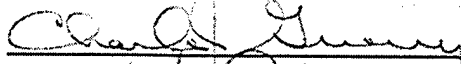
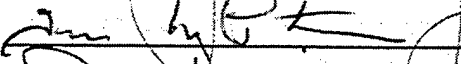
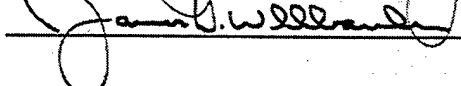
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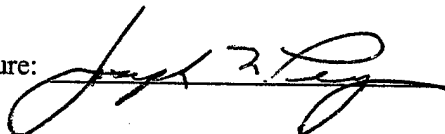
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